RAILROAD GAZETTE

FRIDAY, JAN. 26, 1894.

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Contributions.

Ballast Unloaders.

Lidgerwood Manufacturing Company.
NEW YORK, Jan. 17, 1894.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Referring to the communication in your issue of Jan. 5 in regard to the patents on the rapid unloader and the capacity of the cars, we would like to state that the first rapid unloader was built by us over three years ago, and the patent bears the date of Sept. 20, 1892. The application, we understand, was on file something over a year before the patent was allowed.

In the matter of capacity we would like to quote from a letter recently received from Messrs Drake & Stratton, dated Sept. 14, 1893, from the Delaware & Hudson Canal Co.: ". . . The total number of yards taken out of the pit being 108,391. As the total number of cars taken out, according to our record, is 7,076, this makes the average of 15 yds. per car, which we have been allowing in the monthly estimates, about right, and a little below the correct average load."

In reference to the matter of having 20 yds. on each car, we beg to say that the Drake & Stratton Co., on their work use a car 35 ft. over all, and 9 ft. wide, 60,000 lbs. capacity, with 10-in. sideboards, and they pile up from 20 to 21 yds. of gravel on these heavy cars with the steam shovel, and easily unload the same with the rapid unloader. The average of 15 yds. per car taken from the Del. & Hudson Canal Co.'s letter was lower than 20 yds., because the large majority of the cars were the D. & H. cars, which are 30 ft. × 8 ft., the capacity of which was such as to reduce the average to the point named.

LIDGERWOOD MFG. CO.

The Uses of the Transition Curve.

TO THE EDITOR OF THE RAILROAD GAZETTE:

You have published numerous articles on easement or transition curves, but I do not remember seeing the fact clearly brought out in any of them that, so far as the main curve is concerned, they amount to nothing. There seems to be a notion prevalent among transition enthusiasts that motion can be coaxed into the direction of a curve, instead of always tending to act in a straight line. We occasionally read in works on transition curves that they are intended to avoid any shock from too sudden a change from a straight line to a curve. But so far as the tendency of the train is concerned, we are just as much on tangent at any point on the curve as at the beginning. Until the universe is made anew, we will never get rid of being "tangent." The shock is as great so far as centrifugal motion is concerned at each and every point of the main curve as at its beginning, where our tender-hearted transitionists try to relieve our sensibilities.

Of course changing any curve to one of greater radius will lessen the centrifugal annoyances; but as soon as the transaction curve is past we are as badly off as ever, circular elements alone being considered.

The value of a transition curve lies only in enabling lateral elevation to be secured gradually and in proper relation to the degree of curvature. It does away with an undesirable lateral elevation on tangent or remedies a lateral elevation on curve that otherwise, on account of the necessity of graduating of the lateral elevation, would be lower than the degree of curve requires.

TANGENT.

[" Tangent " probably does not ride a bicycle or he would have learned the possibility of a vehicle traveling in a curved path without shocks or lateral strains. A track which is always normal to the resultant of the centrifugal force and weight of a car will not give shocks to the car in passing over it, and it is only by the use of easement or transition curves that such a track can be built.—EDITOR RAILROAD GAZETTE.]

The Louisville & Jeffersonville Bridge.

Union Pacific Railway System, Chief Engineer's Office, OMAHA, Neb., Jan. 17, 1894.

TO THE EDITOR OF THE RAILROAD GAZETTE:

As our most valuable lessons in engineering are learned from failure, further discussion of the fall of the Louisville & Jeffersonville Bridge may not be out of place; indeed, it should be the duty of all engineers expert in bridge works to make such a careful study of failures that they may form opinions as to just what caused the wreck, and their further duty to throw any new light upon the subject.

Mr. T. C. Clarke's "Moral: In very long spans, you cannot have too much vertical, or sway, bracing," published in your issue of Dec. 29, should be printed again, as it calls attention to the chief defect in the spans that have fallen.

In the writer's opinion the "Petit Truss" is a truss that represents the result of sharp competition and a rustle for cheapness, regardless of all other considerations, and violates all of the good principles of good bridge construction that we are taught in days of innocence and youth to observe:

(1) In containing the greatest possible number of primary members, or those which receive maximum stresses, with each passage of a locomotive.

(2) In having the greatest number of extra members, or rather pieces whose only duty is to hold the members in place, and like unto a lot of policemen in a crowd of workers, may do more harm than good. It is very evident that without proper connections they can do no good, and it is certain that with good connections, they do some harm which is not taken into account, as they induce strains in the members which they connect through the elastic changes in the lengths of working members. Cannot our scientific brethren give us some analysis of these secondary strains?

(3) The great variation in sizes of members, inducing stresses through sudden changes in temperature, the larger masses requiring more time to change. When we consider that there is a stress induced of 200 lbs. per square inch for each degree of difference in temperature, we can realize what a serious matter this is, and how generally neglected.

(4) A general lack of stiffness. The top chord is the weakest part of the bridge. Being a long compression member, it is in, what might be termed, unstable equilibrium, dependent upon the posts to hold it in line vertically, and the lateral bracing, laterally.

The panels of this truss are over 60 ft. long, and it is only at these intervals that sway bracing can be put in and positive support given to the chord. The intermediate sub-panel point cannot be held with sufficient rigidity to give positive support to the chord, and the intermediate bracing at this point has no effect as sway bracing. The top laterals, depended upon to hold the chords in line, if of rods, are slackened by the shortening of the chords through compression stress when loads come upon the span, or, if of stiff members, are compressed, and thus themselves put in a state of unstable equilibrium, both lessening their effectiveness for the purpose of holding the chords in line. These effects are intensified by long distances between points of positive support.

(5) Its general inability to resist destruction by collisions. By far the larger number of bridges that fall are knocked down. There are numerous cases in our old short panel bridges in which a post has been bent by being struck, and the span has stood and carried loads through the assistance which the crippled members received from adjacent panels through the stiffness of the floor and chords; but where, in this case, the posts are 60 ft. apart, failure of the post leaves a length of 120 ft., through which length it would not be possible for the stiffness of floor and chords to act with effect.

In your editorial of Dec. 22 you give four instances where falseworks have fallen within a comparatively short time under similar conditions, viz., Cincinnati, Wheeling, Licking River and Louisville. In the writer's memory this exceeds the number of failures that have occurred in a long stretch of time. The fact that they were all of one style of construction, the "Petit truss," makes it pertinent to inquire whether the trouble is not due, in a measure, to the form of truss used. In the erection of these spans with the usual falsework of short spans, the great concentration of weight at the panel points 60 ft. apart, increased by the weight of the moving traveler, might very reasonably cripple the long posts of the falsework, without assuming that the traveler has stiffness enough to throw its whole weight on one corner, which is hardly possible as travelers are usually built.

In reference to the fall of the span from which the falsework had previously been removed, the failure of this span has been ascribed to the breaking of the end post joint at the bottom of the portal strut, on the assumption that the bottom laterals in the end bottom panels being omitted, all of the lateral shear must be transmitted to the pier through the end posts.

This is hardly a reasonable explanation, and one that is rejected by Mr. Deans, the engineer of the bridge company, who states that this joint was bolted up with seventy bolts. Even without bolts calculations show that it had sufficient strength to transmit the shear and bending moment from the wind without displacement, on account of the large compression from the weight of the structure, even if all the lateral resistance were required at this point.

This explanation is rendered still less reasonable when we consider the large amount of lateral resistance certainly afforded by the sway bracing between the posts, and transmitted to the pier through the bottom chords, which, without bracing, act in the manner of suspension cables to transmit the shear by tension.

The writer recalls a case where the falsework was carried out from under a span within an hour of the time it was swung. The span had the usual three or four bolts at each joint, had the floor-beams in, but no bottom laterals or stringers. It was deflected about three feet out of line by the falsework as the current took it out, but after vibrating a while, came to rest in good shape.

In the Louisville span sway bracing between the truss posts occurs at such long intervals (over 60 ft.) that its action is largely local, and it is easy to see that in a structure temporarily bolted up, the looseness of the bolts, or the usual insufficiency of the bolts, in such cases, in one frame of sway bracing, would leave a space of over 120 ft. with very little stiffness, and the pulsations of the wind might cause the top chord to buckle at a joint. The "moral" pointed by Mr. Clarke would then have its illustration.

The "Petit truss" is so generally used that this criticism cannot be construed to reflect especially upon the designers of the Louisville bridge. Indeed, viewed in the light of current practice, their work seems to have been carefully designed. If the erection bolts were put in as reported, the spans had an unusual amount of strength at that stage, as spans are being erected all the time, and traffic carried by them during erection, with frequently a smaller proportion of bolts.

GEO. H. PEGRAM.

Annual Meeting of the American Society of Civil Engineers.

The forty-first annual meeting of the American Society of Civil Engineers was held at the Society House on Wednesday, Jan. 17, with 125 members registered, and President Metcalf in the chair. The morning session was occupied with the reports of the Board of Direction, the Treasurer, the Auditor and the committees on Finance, Information and Courtesy, and Badges.

The report of the Board shows an eventful year in the history of the Society and one of considerable prosperity. The Engineering Congress at the World's Fair, the preparation, translation and publication of the numerous papers in connection therewith, the work and expense of welcoming and entertaining foreign engineers, the discussion and abandonment of the idea of a code of ethics, have all been incidents of the year's work. Both the retiring and incoming presidents were warm in their praises of the work of the Board of Direction.

The membership has continued to increase and now numbers 1,733. The gain was 162 and the loss 73. Of this number 65 were members, 34 associate members, 42 juniors, 3 associates, 1 honorary member and 1 fellow, and 16 were transfered to a higher standing. The Society lost by various ways 33 members, 6 associate members, 4 associates, 27 juniors and 2 fellows and 1 honorary member. The library at present contains 17,886 books and pamphlets, 664 of which have been received during the past year. The publications of the Society have been unusually large, consisting of 2,578 pages and 220 plates, equivalent to 3,100 pages of the *Transactions* at a cost of $20,428. There were presented to the Engineering Congress 50 papers, containing 1,155 pages with 129 plates and 70 cuts, which were accepted. Three hundred and forty-eight civil engineers were registered at the Engineering Congress at the World's Fair during the summer; 207 of these were members of the Society, 76 visitors from the United States, 65 foreign visitors and delegates. At 12 o'clock the President declared the polls closed and the meeting adjourned until 8 o'clock in the evening, when the result of the ballot for officers should be announced.

At 20 o'clock the meeting reconvened to hear the result of the election, which was reported in our issue of last week. The only doubtful issue was decisively settled by a heavy vote and solid majority. President-Elect Craighill was introduced and expressed his thanks for the honor conferred upon him, and pledged his earnest support and hearty co-operation in the work of the Society.

Mr. Collingwood, Secretary of the Society, brought to the notice of the members some facts regarding the attendance of the young men and regretted that the juniors were not as active as they should be; that they joined the Society, attended a few meetings, took no part except to listen, and in a short time ceased to attend the meetings entirely. Therefore to interest the juniors of the Society in its work he offered a $1,000, 5 per cent. bond, to establish a fund for a prize of $50 annually to be awarded upon proper conditions for the best paper submitted each year by a junior member. The Society passed a resolution that a committee of the Board of Direction be appointed to confer with Mr. Collingwood as to the details of the gift and the conditions under which the prize shou ..be awarded.

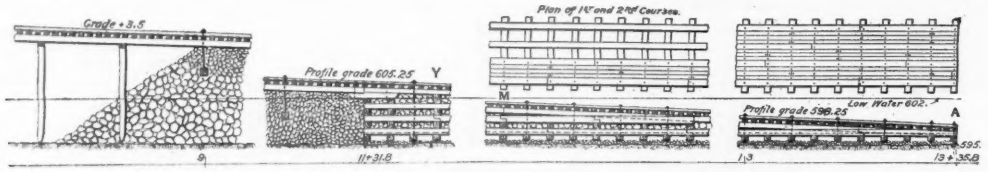


Fig. 1. Riprap and Crib Incline. Fig. 2.

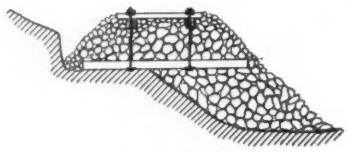


Fig. 3—End Elevation.

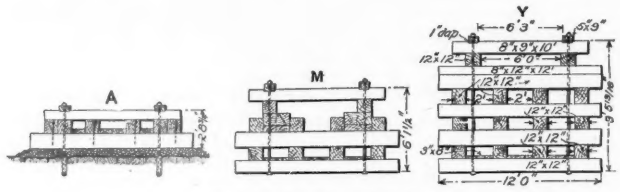


Fig. 4—Sections of Crib.

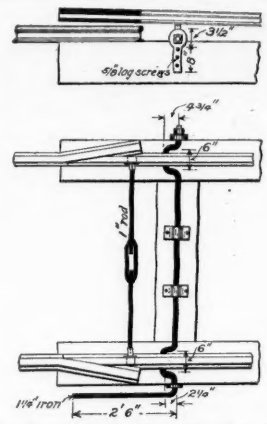


Fig. 9—Track Connection; Cradle to Barge.

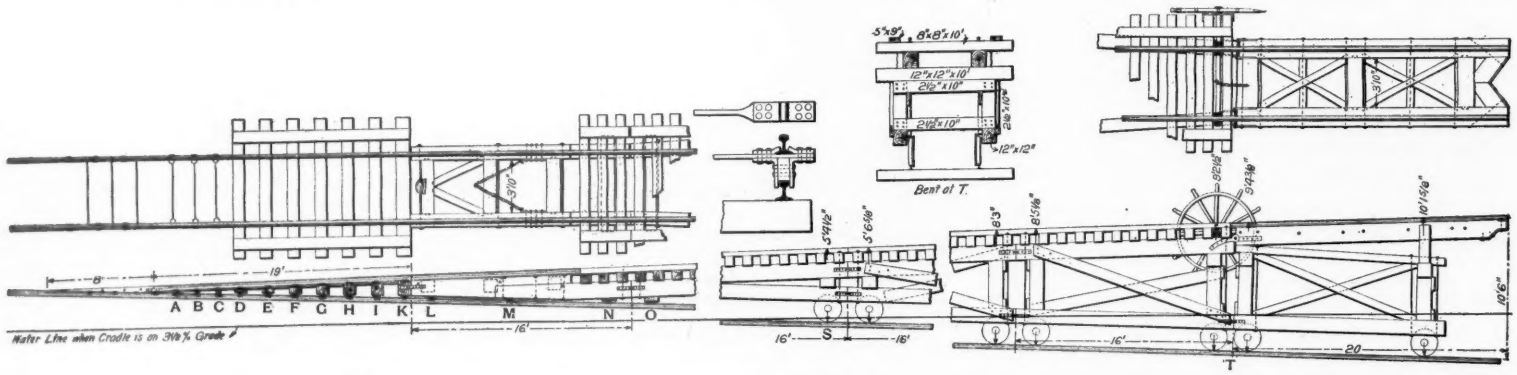


Fig. 8. Fig. 7. Fig. 6.

Cradle at Guntersville.

HOBB'S ISLAND FERRY TRANSFER.

A resoltion was adopted recommending that all special committees should make report to the Secretary at least 30 days before the meeting, in order that the Secretary and officers of the Society should be advised of what matters were to be brought up at the annual meetings, to enable them, if deemed advisable, to publish such report before such meeting. The business meeting was concluded by a short address by President Metcalf before retiring, in which he endeavored to clear up some mistaken views of a few non-resident members of the Society with regard to a "New York ring." The business meeting then adjourned.

The members then listened to a very interesting paper by Mr. Spencer Miller, Associate, on the subject of Cableways as employed in hoisting and carrying. The lecture was illustrated by stereopticon views, and was on the whole very interesting and instructive. An abstract of the paper will be given in a future issue. The meeting closed after a vote of thanks to the lecturer.

On Thursday morning, the 18th, about 200 members of the Society took the steamer Laura M. Starin from the new pier of the American Line and went to Sandy Hook to visit the new fortifications being erected there by the Government. They were entertained by Colonel Gillespie, Corps of Engineers, U. S. A., and Captain Zalinski, of the U. S. Artillery, who showed the members throughout the works. The first object of interest visited was a recently erected battery of two 12-in. rifled guns on disappearing carriages. These are protected behind heavy granite walls and command the channel for a radius of five miles. These guns were not fired on account of the fog and the danger to vessels. The party was shown through the mortar battery of 16 pieces with its ditches, subterranean passages and magazines. This battery is protected by being placed in four pits of an artificial sand bank with four mortars in each pit, the pits being cemented and made watertight. The outside dimensions of the works are 600 and 400 ft. Considerable interest was taken in the method of preparing the foundations of these mortars, which are considerably below low tide, the process having been adopted of pumping from the sand for 12 to 20 hours and exhausting the water underneath the pits so that the sand could be excavated and the concrete and foundation courses put in. After visiting these two interesting works the party returned to the steamboat for a lunch. After lunch the party proceeded to the proving grounds, where some firing was done with big guns. One of the most interesting features was the testing of armor plate. The Buffington-Crozier disappearing carriages were examined and several shots were fired from the mortars.

The excursion proved a disappointment to a few members of the society who are not American citizens. The Secretary of War granted permission to inspect the defense works only on condition that all foreigners be excluded. Photographic cameras were also forbidden. This was no new thing, as there has been a prohibitory order denying aliens access to government works since 1874, though we believe it has not been rigidly enforced. Many members of the society express some surprise at it, having themselves frequently visited government fortifications and works without ever having been questioned as to whether they were aliens or citizens.

At the meeting of the Board of Direction immediately after the annual business meeting, Sir Casimir S. Gzowski was elected a director for one year to fill the vacancy occasioned by the election of Col. William P. Craighill to the Presidency. Mr. Charles Warren Hunt was reappointed Assistant Secretary for one year and the following standing committees were appointed: *Finance*, L. L. Buck, Charles MacDonald, Joseph M. Wilson, C. C. Martin, Sir Casimir S. Gzowski. *Library*, H. G. Prout, B. H. Harrod, O. H. Landrith, T. Gilford Smith, R. B. Stanton. *Publications*, Foster Crowell, Desmond Fitzgerald, E. L. Corthell, F. D. Stearns, W. H. Burr.

In the evening a reception was held at 20 o'clock at the Society House.

The Hobb's Island Ferry Transfer.

In order to establish connections between the Nashville, Chattanooga & St. Louis Railroad and its branch, the Tennessee & Coosa Railroad, it was deemed best and most economical to employ transfer boats and barges between Hobb's Island and Guntersville, Ala., a distance of 20 miles. The track of this connecting line is built through the river bottoms and in the vicinity of transfer stations is on the high water mark. In order to operate the transfer at all stages of the water an incline had to be built from the high water mark to within 2 ft. of the bed of the river. These inclines, cradles and other necessary works present some interesting features which are shown in the accompanying engraving. The inclines on the north and south side of the river are very similar, and a description of one will answer for both.

Figs. 1 and 2 show a side elevation and plan of the crib and riprap incline at Hobb's Island, and figs. 3 and 4 show transverse sections of the same at the points indicated. Little can be said in describing this crib and riprap, as the sizes and dimensions are shown in the figures. The rise or fall of the Tennessee at Hobb's Island is 40 ft. and the incline is built on a tangent with a grade of 3½ per cent. It is 1,370 ft. long, with a total fall of 47.9 ft.; 400 ft. is on a fill, 490 ft. on pile trestle, 276 ft. on riprap bank and 204 ft. on crib. The crib and riprap at this point were used because the character of the river bed was such that piles could not be driven.

The method of construction of the cribs employed was as follows: First, a course of 12 × 12 in. 12 ft. timbers were floated into place at distances of 4 ft. center to center and fastened together temporarily. On top of these a longitudinal course of 12 × 12 in. 25 ft. timbers was placed center to center and the spaces between covered with 2 × 8 in. plank flooring. On this longitudinal course were placed other transverse courses of 12 × 12 in. 12 ft. timbers, 8 ft. apart alternated with longitudinal courses, as shown in the sections fig. 4. The 12 × 12 timbers were spiked at every crossing with 20 × ⅝ in. square ragged drift bolts and lapped joints in stringer-courses were fastened with two such bolts. The timbers in the crib 14 in. below the profile grade were sized down to a true surface to admit a 12 × 12 in. stringer to rest on them at the proper incline. On these stringer courses were placed 8 × 9 in. 10 ft. ties, 16 in. center to center. Each tie was fastened to stringers with two 1 × 4 in. dowel pins, and the ties were further joined together by 5 × 9 in. pine guard rails 7 ft. apart. At each 16 ft. length, bolts of proper length were passed up through the bottom course of 12 × 12 in. through the other timbers above and through the guard rail. Before the ties were put on the crib

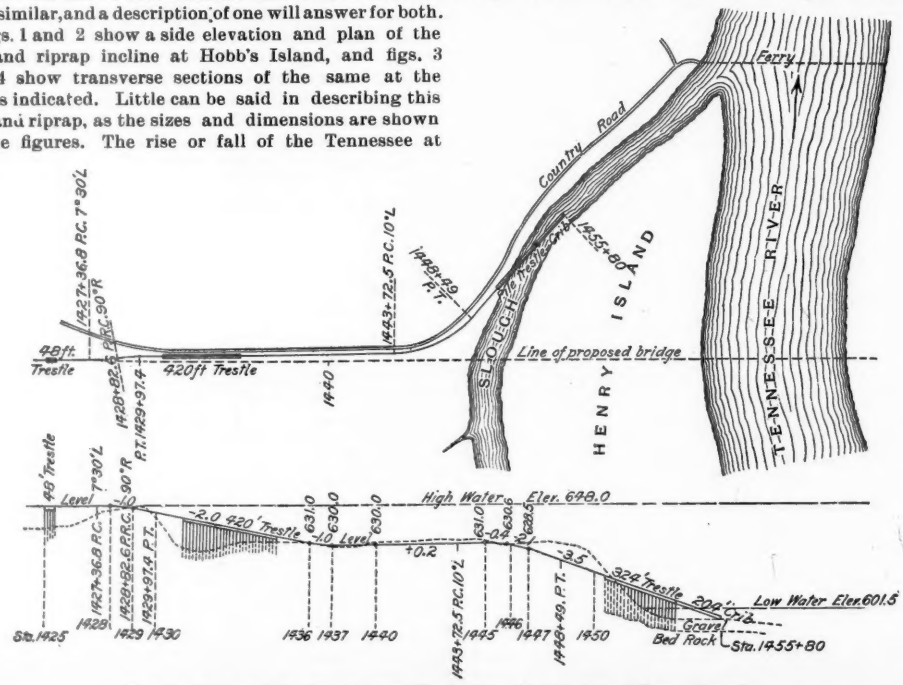


Fig. 5—Plan and Profile Guntersville Incline, Hobb's Island Ferry Transfer.

they were suspended between barges and towed to its proper position. It was then thoroughly filled with small stone, after which the ties, guard rails and rails were put on and the whole sunk into its place on a bed of broken stone which had been built to the proper elevation. The lower end of the crib was anchored by rocks piled on the floor of the lower course, which timbers extended out 6 ft. on each side of the crib. About 50 ft. of the lower end of the crib was anchored in this way. Large rocks were then finally thrown alongside the crib to hold it in place laterally.

Essentially the same process of construction was followed in the Guntersville crib, but the construction and operation of the cradles presented some difficulties in consequence of the incline being upon a curve. Fig. 5 shows the alignment and profile of the Guntersville incline. It also has the additional feature of a piece of level track intermediate between the two inclines as shown in the profile. The curve is a 10 deg. curve, and the cradle had to be built so that it could be used on this curve or on the tangent which required it to be of a special design. This cradle consists of a 20-ft. apron carried by a 15-ft. section on wheels (shown in fig. 6 and fig. 10); seven 16-ft. sections on wheels similar to the first section of fig. 6 and the one shown in fig. 7; two sliding sections, one 16 ft. and another 19 ft., both shown in fig. 8; and an 8 ft. feather rail, making 175 ft. over all. This cradle is on a + 2.4 grade when standing on a — 3.5 per cent. grade of the incline. The sections mentioned and shown in the engraving are not rigidly connected together, but are coupled by means of four plates or stringer splices shown in figs. 6, 7 and 8. These splices are 13 in. long made of 1 × 4 in. iron with a 4-in. angle at the end. A bolt 1 × 6 ins. passes through the hole on the angle, and allows about 5 in. play to enable the sections to take the curve easily. The stringers in the sliding section and the apron are 4 ft. 10 in. center to center so as to carry the rail; and in the rolling sections they are 6 ft. center to center, as ties are used in these sections. The ties are 8 × 9 in., 10 ft. 16 in. center to center, and the guard rails 5 × 9 in. dapped one inch on the ties.

The rails of this cradle are laid with opposite joints spiked only at the joints and held together by means of tie-bars. The rails on the side which becomes the inside of the curve are 15 ft. 10¼ in. long, and on the opposite side 16 ft. long. When the cradle is on a tangent the 16-ft. rails make a close joint, and a "dutchman" 1⅜ in. long, made of a section of rail with base cut off, is inserted in the open joint on the other side. This "dutchman" is held in place by a split key which passes through the splices and through the web of the "dutchman." When the cradle is to be put on the curve, these "dutchmen" are taken out, and if to be used on the curve they are inserted in the joints of the outside rail. Bolt holes in the rails are slotted so as to allow for this movement. This cradle is handled with a 30-ft. push bar in either direction. It requires two engines to move it up the incline after it is out of reach of the boat. One engine or the boat can handle it in the water.

Fig. 7 shows the construction of the slide in section. The dimensions and details of the cradle are shown in the figures in considerable detail.

An inspection of the profile will show that the Guntersville incline is made up of two inclines, one on a two per cent. grade and the other on a 3.5 grade with 900 ft. of level track between them. It is expected that for 10 months of the year transferring will be done on the lower incline, part of which is on a 10-deg. curve, but during high water it will be necessary to pull the cradle to the upper incline, which is on a tangent. There can be no transferring when the water is shallow over that part of the track which is level, for the reason that the boats cannot pass over it to the upper incline. This will necessitate the abandonment of trains when the water is at such a height as to cover the level track and to require the use of the upper incline, but which will not permit boats to come to it. This does not occur more than twice a year, and then only for a day or two, and as the traffic is light such an interruption will not occasion serious consequences.

Track Construction. — The method of connecting track of barge to that of the apron is a new feature and is an improvement on the use of stub rails, which are usually employed. This is shown in fig. 9. The end of the rail on the apron is turned at an angle of about 30 deg., a little behind the point where the ends of the rail on the barge will come when the barge's nose is brought to place in the V of the apron. The ends of the 20-ft. rails on the barge are planed off at an angle to correspond to that of the rail on the apron, the beveled portion being 8 in. long. These 20-ft. swing rails or points are held together by four tie-bars, and near the beveled ends there is a 1-in. tie-rod with turnbuckle in the center. Just back of this rod and resting on the track stringers, there is a 1¼-in. rod with two 4¾-in. cranks under the rails. This rod is fastened to the stringers with short eye-bars and is bent at right angles to itself, forming a lever 2 ft. 6 in. long. By means of this the rails are lifted up so that they entirely clear the rails on the apron when barge comes to place. With the turnbuckle rod the gage at the point is narrowed about half an inch, and when barge is in place and rails lowered they are brought to a proper gage and match perfectly with the rails on the apron, thus making practically a continuous rail from apron to barge.

The cost of the crib and cradle at Hobb's Island was $43,443.19 and $837.39 respectively, and at Guntersville $3,045.16 and $961.00 respectively. The transfer plant consists of two stern-wheel steamboats, one of 90 and one of 40 tons burthen, and two double-track barges, one for eight and one for six cars. The lighter steamer is used for passengers, and the larger for handling the barges. This plant cost 30,368 dollars.

The time occupied in making the trip between Hobb's Island and Guntersville is about two hours for passenger boat and 2½ hours for freight boat. The work was designed and constructed under the direction and supervision Mr. G. D. Hicks, Division Superintendent of the Nashville, Chattanooga & St. Louis Railway.

A New Adjustable Reamer.

The Standard Tool Company, of Cleveland, O., offers to its customers a new patent adjustable universal reamer which has the advantage of other reamers already on the market in having a much greater range of sizes. A 3-in. reamer will do for all sizes from 3 to 3⅛-in., thus allowing the reamer to be kept to a standard of 3 in. with ⅛ of an inch wear, or to be used for any and all sizes within its range. The cuts, figs. 1 and 2, illustrate its construction. At the left of the section, fig. 2, is a lock nut, and within the tool is a taper nut, both shown in the illustration. If the lock nut be loosened and the taper nut screwed up, the blades will be forced out and the tool enlarged to any size desired

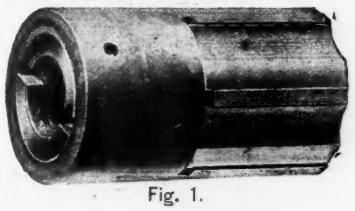


Fig. 1.

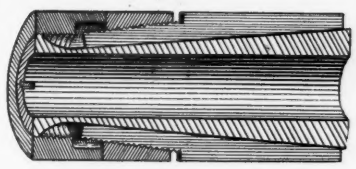


Fig. 2.

Adjustable Universal Shell Reamers.

within the limits, after which the lock nut is screwed up tight and the reamer is ready for work. The tools are very carefully and accurately made, and all the parts are interchangeable, so that duplicates may be supplied when the old pieces are worn. The blades are made from Jessop tool steel, carefully tempered and ground. The other parts of the tool, including the ends, are hardened. The shell reamers are made with taper holes for standard arbors in all sizes from 2¼ to 6 in. in diameter. The smaller tools are made with solid shanks. Stock is carried at all sizes from 1 to 4 in. in diameter, and the manufacturers especially solicit a sample order from manufacturers for trial.

Locomotives at the World's Fair.

In the *Railroad Gazette* of June 16, Oct. 27 and Nov. 24, 1893, there were published illustrations and detailed descriptions of locomotives exhibited at the World's Columbian Exposition. Those articles showed all of the American engines for standard railroads, both standard gage and narrow gage, except the Shay locomotive for logging roads, the historic engines now out of service, and the New York Central engine No. 999.

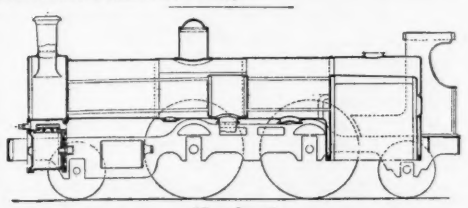
We now present certain information concerning the foreign engines exhibited, and for the sake of completeness include a memorandum of the main features of the New York Central engine just mentioned. For convenience we have numbered the engines, here described, from 1 to 10.

Number 1.

New York Central & Hudson River Railroad, No. 999.

Built at the West Albany shops of the company. Simple engine, burning bituminous coal. This engine was described and illustrated in the *Railroad Gazette* of April 28, 1893.

Cylinders.....19 x 24 in.	Heating surf., firebox..232.92 sq. ft.
Weight on drivers.....84,000 lbs.	Heating surf., tubes..1,697.45 sq. ft.
Weight on truck wheels..40,000 lbs.	Heating surf., total...1,930.37 sq. ft.
Weight, total.....124, 0 lbs.	Grate area .....34.7 sq. ft.
Wheel base, engine ....23 ft. 11 in.	Driving wheels, diam..... 84 in.
Wheel base, driving.....8 ft. 6 in.	Engine truck wheels, diam...40 in.
Boiler, diam.....58⅜ in.	Tender truck wheels, diam..40 in.
H't stack above rails...14 ft. 10 in.	



Number 2.

The "Queen Empress," London & North Western Railway.

Three-cylinder compound; fuel, bituminous coal.

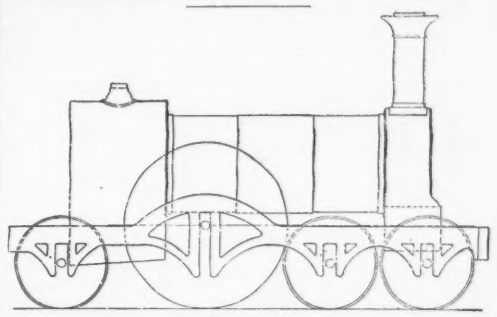
Cylinders....'5 & 30 x 24 in., 3 cyls.	Heating surf., firebox..159.7 sq. ft.
Weight on drivers.....69,440 lbs.	Heating surf., tubes...1,346.0 sq. ft.
Weight on truck wheels.47,240 lbs.	Heating surf., total...1,505.7 sq. ft
Weight, total .....116,680 lbs.	Grate area .....20.5 sq. ft.
Wheel base, engine.....23 ft. 8 in.	Driving wheels, diam .....85 in.
Wheel base, driving.....9 ft. 3 in.	Truck wheels, diam..... 49½ in.
Boiler, diam..... 51 in.	Tender truck wheels, diam.....
H't stack above rails...13 ft. 1⅛ in.	

Number 3.

"James Toleman," Made by Westwood & Winby.

This is a simple engine with four cylinders, and was described and illustrated in the *Railroad Gazette* of May 19, 1893.

Cylinders.. 16½ x 24 in., 17 x 22 in.	Heating surf., firebox..132.6 sq. ft.
Weight on drivers .....78,400 lbs.	Heating surf., tubes...1,817.4 sq. ft.
Weight on truck wheels .56,000 lbs.	Heating surf., total...2,0 0.0 sq. ft.
Weight, total .....134,400 lbs.	Grate area .....28.0 sq. ft.
Wheel base, engine .....23 ft. 8 in	Driving wheels, diam .....9 in.
Wheel base, driving.. 11 ft. 4½ in.	Truck wheels, diam.....48 in.
Boiler, diam..... 25 in. radius	Tender truck wheels, diam..——
H't stack above rails .13 ft. 6 in.	

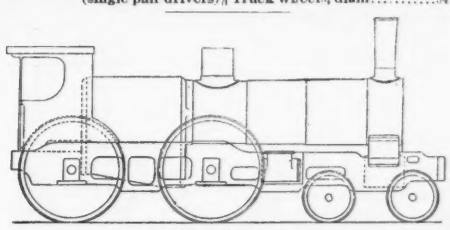


Number 4.

"Lord of the Isles."

This is a simple engine, burning bituminous coal, and was in the nature of a historical exhibit, the engine having been built for the 7-ft. gage, Great Western Railway of England, in 1851. It was kept in service until July, 1881, having traveled 789,300 miles. This engine has 300 tubes and the firebox is 5½ ft. long by 6 ft. wide.

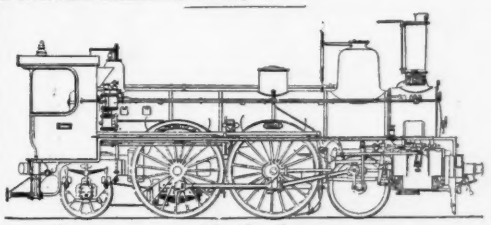
Cylinders.....18 x 24 in.	Boiler, diam.....57 in
Weight on drivers.....33,600 lbs.	Heating surf., firebox.... 1 6 sq. ft.
Weight on truck wheels.51,920 lbs.	Heating surf., tubes ...1,611 sq ft.
Weight, total .....85,520 lbs.	Heating surf., total.....1,767 sq. ft.
Wheel base, engine.....18 ft. 8 in.	Grate area .....25.4 sq. ft.
Wheel base, driving, (single pair drivers)	Driving wheels, diam ... . . 95 in.
	Truck wheels, diam.....54 in.



Number 5.

Northern Railroad of France—Compound Express Locomotive.

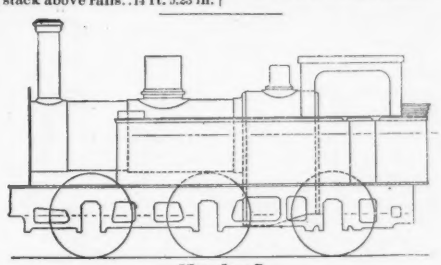
Cylinders.....13.39 & 20.87 x 23.2 in.	Heating surf., firebox..146.06 sq. ft.
Weight on drivers .....68,320 lbs.	Heating surf., tubes..1,065.44 sq. ft.
Weight on truck wheels 38,752 lbs.	Heating surf., total. 1,211 50 sq ft.
Weight, total.... ... .107,072 lbs.	Grate area.....21.96 sq. ft.
Wheel base, engine....19 ft. 8 22 in.	Driving wheels, diam ....83.86 in.
Wheel base, driving...6 ft. 10.68 in	Truck wheels, diam..... 40.9 in.
Boiler, diam .....49.6 in.	Tender truck wheels.. ..... ——
H't stack above rails..14 ft. 5.23 in.	



Number 6.

French State Railroads, No. 2609—Simple Engine.

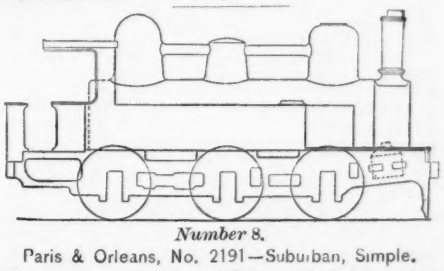
Cylinders.....17.4 x 25.7 in.	Heating surf., firebox..101.7 sq ft.
Weight on drivers..... 56,890 lbs.	Heating surf., tubes...1,193.9 sq. ft.
Weight on truck wheels.35,580 lbs.	Heating surf., total.. 1,294.6 sq. ft.
Weight, total. .....92,520 lbs.	Grate area..... .....20.8 sq. ft.
Wheel base, engine ....19 ft. 8.22 in.	Driving wheels, diam..... 79⅛ in.
Wheel base, driving...6 ft. 10 68 in.	Truck wheels, diam...52 and 44 in.
Boiler, diam .. . . . 48.52 in.	Tender truck wheels, diam.. ——
H't stack above rails..14 ft. 5.23 in.	



Number 7.

Western Railroad of France, No. 3560—Suburban, Simple.

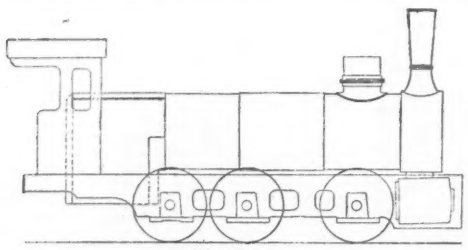
Cylinders.....17 x 23¾ in.	H't stack above rails.13 ft. 1.73 in.
Weight on drivers .....92,814 lbs.	Heating surf., firebox....81.8 sq. ft.
Weight on truck wheels.. ..——	Heating surf., tubes ....953.7 sq. ft.
Weight, total.. .....92,814 lbs.	Heating surf., total....1,035.5 sq ft.
Wheel base, engine.....14 ft. 7.2 in.	Grate area..... .... 13.8 sq. ft.
Wheel base, driving....14 ft. 7.2 in.	Driving wheels, diam.... .59½ ft.
Boiler, diam..... .....48 in.	



Number 8.

Paris & Orleans, No. 2191—Suburban, Simple.

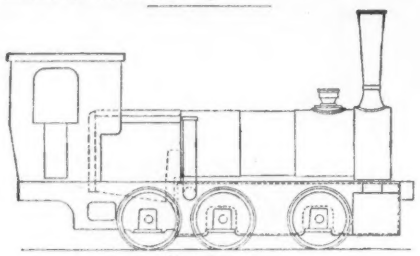
Cylinders..... .....17¾ x 25½ in.	Heating surf., firebox....13 sq. ft.
Weight on drivers. .. ...93,800 lbs.	Heating surf., tubes...1,1 9.7 sq. ft.
Weight on truck wheels..... ——	Heating surf., total....1,369.7 sq. ft.
Weight, total.. ..... 93,800 lbs.	Grate area .. ..19.8 sq. ft.
Wheel base, engine .14 ft. 11.13 in.	Driving wheels, diam .. ..60.63 in.
Wheel base, driving..14 ft. 11.13 in.	Truck wheels, diam ..... ——
Boiler, diam..... .....4.3½ in.	Tender truck wheels, diam. ——
H't stack above rails..13 ft. 9.35 in	



Number 9.

Prussian State Railroad—Compound Freight.

Cylinders.....18.11 & 25.59 x 24.75 in.	Heating surf., firebox..83.74 sq. ft.
Weight on drivers..... 84,990 lbs.	Heating surf., tubes...1,282.5 sq. ft.
Weight on truck wheels.. ..———	Heating surf., total..1,316.24 sq. ft.
Weight, total... .....84,990 lbs.	Grate area ..... 12.01 sq. ft.
Wheel base, engine....11 ft. 1.86 in.	Driving wheels, diam . ..52.36 in.
Wheel base, driving...11 ft. 1.86 in.	Truck wheels, diam .....
Boiler, diam..... 53.15 in.	Tender truck wheels, diam.38.6 in.
H't stack above rails..13 ft. 7.29 in.	



Number 10.

Prussian State Railroad, No. 1838—Tank Locomotive, Simple.

Cylinders.....13⅝ x 21⅝ in.	H't stack above rails..13 ft. 7⅜ in.
Weight on drivers.....65,807 lbs.	Heating surf , firebox....51.7 sq. ft.
Weight on truck wheels.... —	Heating surf., tubes... .606. sq. ft.
Weight, total..... . 65,807 lbs.	Heating surf., total... ..657.7 sq. ft.
Wheel base, engine....9 ft. 10½ in.	Grate area ..... .14 sq. ft.
Wheel base, driving...9 ft. 10½ in.	Driving wheels, diam... ...42⅛ in.
Boiler, diam..... .....44⅛ in.	

Fire Risks of Railroad Property.

Few railroads to-day undertake to carry their own fire risks, the experience of those attempting to do without insurance having been unfortunate. The premiums on railroad schedules are tempting, and there are always companies outside of the Railroad Insurance Syndicate ready to compete. Railroad insurance is one of the most hazardous of all the risky specialties in the underwriting field, and the syndicate is necessarily composed of veteran underwriters of the bravest type. So generally accepted, among the fire insurance men, is the belief that more than average wisdom is requisite for the transaction of railroad insurance that the specialists in this line are termed "railroad owls."

The physical hazard of railroad property does not compare favorably with that of average risks. Proper construction and protection as regards fire prevention are not duly considered. Underwriters claim that there is little logic in the assertion made by some railroad officers that their property "is so scattered that the road can carry its own insurance." The property they call scattered consists largely of small depots, engine houses, coal docks and bridges, generally constructed of wood, and so located as to be devoid of water supply or other fire protection. These points, as well as large accumulations of property, should have fire protection, not merely to reduce fire insurance rates but also to guard the interests of bond and stockholders. The fire losses on the class during the past few years have been unnecessarily heavy.

One of the principal subjects of loss is rolling stock and merchandise in transit, caused by wrecks. Fire follows, igniting from firebox of engine, oil lamps or stoves. The "railroad owls" state that this class of loss is more frequent than formerly. Caboose cars should be provided with a reliable hand chemical fire extinguisher, two iron pails, an axe and a hammer. Baggage cars should be similarly equipped. Roofs of cars should be kept in good repair. Sand, and not straw, should be used for bedding in open stock cars. Inflammable merchandise should not be carried in open cars. . . . A prominent railroad expert deems it a good investment to maintain a watchman and cask of water at trestles and bridges. Shops, piers and elevators should be well supplied with hydrants, hose, iron pails and casks of brine, and, above all, with approved electric night watch-clock service, the dials to be regularly examined. Steam syphon pumps on yard engines, hose connections with injector or engines, are valuable. There is no economy in placing shingle or board roofs on property within range of sparks from passing engines. Pails of sand and a chemical extinguisher in oil houses and paint shops are better than water.

Small coalheavers' shanties, with stoves, on coal docks are dangerous. Sand burners should not be placed on coal docks or near the buildings. Detached buildings should, where practicable, be provided for the storage of patterns, and exhaust for shavings and sawdust is desirable in woodworking shops. Brick walls with iron doors dividing round houses into sections would save many engines. Pits should be bricked and have adjustable hoods. Blowers should not be used in engine house. Steam should be used in shops, with pipes on metal brackets. Oil lamps are dangerous. All stoves should be set in large sandbox. Electric light equipments should be safely installed by experienced men, and not by the railroad company itself, for economical reasons. Cotton yards should have a plentiful supply of filled water pails and casks, also watchmen. Alleyways should be maintained therein every 50 ft. between cotton piles, which never should be within 25 ft. of tracks. Cotton lying near the tracks should be covered with tarpaulins. . . . —*New York Journal of Commerce.*

The Jones Under-Feed Mechanical Stoker.

Given herewith are illustrations of a mechanical stoker that promises much in economy, convenience and cleanliness for steam plants. It is shown in fig. 1, and consists of a hopper, *H*, an air passage, *P*, a retort, *R*, a steam cylinder, *C*, and a box, *B*, and is operated as follows: The fire having first been started upon the side grates in the manner usual in hand firing, the hopper *H* is filled with coal and steam admitted to the inner end of the cylinder *C* by a movement of the lever *L*. This allows the coal to drop into the coal box and a reverse movement of the lever admits steam to the other end of the cylinder, forces the ram against the coal and crowds it into the retort. The operation is fully

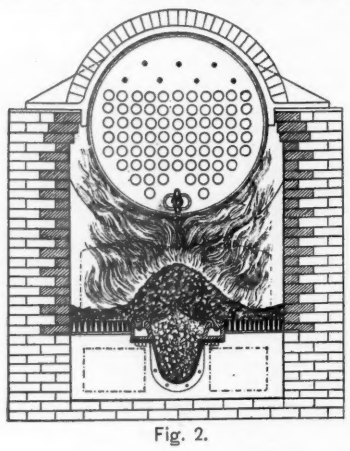


Fig. 2.

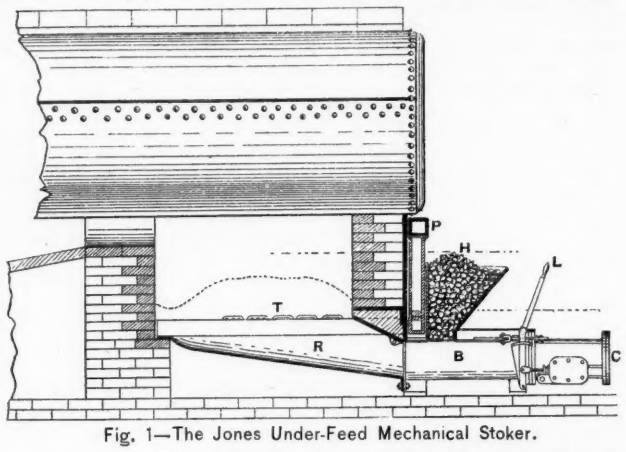
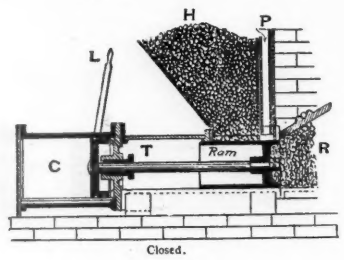


Fig. 1—The Jones Under-Feed Mechanical Stoker.



Closed.

Fig. 3.

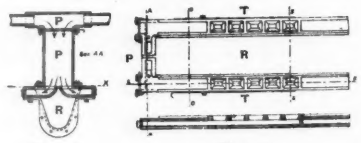


Fig. 4. Fig. 5.

illustrated in fig. 3, and the appearance of the furnace in fig. 2. Fig. 4 shows a cross section of the retort and the air passages to the tuyeres, and fig. 5 shows the plan of these air passages and tuyeres. Air under pressure is admitted through the air passage *P*, and thence by ducts to both sides of the retort and through the tuyeres *T T* into the fire. The air issuing at the top of the fuel in the retort passes under and up through the burning fuel. The result is that the heat of the burning fuel slowly liberates the gas from the green fuel in the retort underneath, and this gas being thoroughly mixed with the incoming air, makes a bright, clear fire, free from smoke and insures perfect combustion. The air passes upward and burns above the air slots, so that the castings of the retort are not subject to great heat. The incoming fresh fuel from the retort forces the ashes and clinker over the tops of the tuyere pipes onto the side grates, from whence they may be removed at any time without in the least interfering with the fire in the center of the furnace, insuring always a high and even temperature. Air is supplied by means of a positive pressure blower and the amount of coal consumed is regulated entirely by the quantity of air forced into the furnace. The device is intended to burn and will burn any kind of slack or screenings and will fully utilize all the heat-giving elements therein, and whether good coal or refuse, slack or screenings are used, the device is said to insure a smokeless stack. A feature that will recommend this device to manufacturers is that it required no change in the boiler proper and only slight changes in the furnace, and in the equipment of a new plant the device can be accommodated to the furnace without any additional expense over what it costs to install common grates for hand firing. There is no moving mechanism exposed to the heat of the furnace, the only moving parts being a plain piston and ram on the outside of the furnace within reach of the operator at all times. The tuyeres or air pipes inside the furnace are protected by the series of tuyere blocks, *T T*, which are depressed on their upper side, and soon fill up with ashes, which offer a simple and effective protection against the heat. The advantages claimed by the manufacturers of this device are that they do not have to open the doors to charge the furnace; that the hottest part of the fire is next the absorbing surface of the boiler; that the temperature is even; that no heat is wasted on firebrick arches; that the stoker is a fuel gas producer and consumer; that no fine particles of coal or coke are lost through the grate bars; that the air and coal are carefully measured and the proper amount of air to fully burn every pound of coal is admitted and at the point where it will do the most good; that no green coal ever reaches the fire, the volatile parts being first liberated mixed with air and consumed and the resulting coke passing into the fire when at a high temperature. The stoker is manufactured by the Jogada Furnace Company, of Portland, Or., Mr. James Garden, Superintendent.

New Passenger Cars for the Norfolk & Western.

The Billmeyer & Small Co. has just completed for the Norfolk & Western four vestibuled coaches that are strictly down to date in every detail. Special attention has been given to service and the safety of passengers. Each truck has four 36-in. wheels, four hollow brake-beams applied by the latest improved Westinghouse automatic air-brake. The truck framework is of oak, lined with heavy iron, while the springs are of delicate tension and immense strength, capable of carrying a load of 70,000 lbs. light weight. The body of the car is framed of yellow pine, thoroughly seasoned, two sills each 5 × 9 in., and six joists each 4½ × 8 in.

These are braced with cross and diagonal braces upon the Howe truss system. Double floors lined with mineral wool serve to stiffen the body and deaden the sound. Thirty-six side posts, besides door and corner posts, hold the roof, which is covered with galvanized iron, the structure being considered strong enough to sustain itself if upset. The draw and buffing gear is the very latest Janney-Buhoup system sustained by eigth oak draw timbers, 4 × 12 in. and 15 ft. long, lined on either side with heavy iron plates. These, with the most modern system of vestibule, render telescoping well igh impossible.

The length is 55 ft. and width 10 ft. It is furnished with 25 Hale & Kilburn high-back tilting seats upholstered in crimson plush. The 34 windows are glazed with crystal plate glass and are hung with Burrowes shades. The whole interior is of the finest oak, selected especially for the place it was designed to occupy. The deck or clearstory lights have muffled glass of a delicate plum color. Twenty-eight deck sash open independently and afford perfect ventilation through brass wire screens. The cars are heated by two of Spear's improved heaters and heat pipes under the seats. The trimmings are of oxidized silver and harmonize perfectly with the other furnishings.

In one corner of the car is a lavatory, water being furnished automatically from an overhead tank artfully concealed beyond oak panelings. Plate glass mirrors with aluminum plaques give a drawing-room finish to the car, which is heightened by Brussels carpet upon the floor.

The saloon accommodations are upon the most modern principles and are all finished in keeping with the body. The smoker is invited to a handsomely furnished compartment upholstered in maroon leather, with broad seats, with high backs, an easy-chair, and a finely finished movable table.

The cars are lighted by seven center lamps of tasty design of the Frost system. The interior has been brought to a rich, dead finish, while the head lining is of lignomur, paneled and colored to harmonize with the whole. The exterior color and decorations are of the standard Pennsylvania style.

No pains or expense has been spared to turn out a coach second to none in safety and beauty.

The Love Electric Conduit for Trolley Wires.

The pronounced statement of the Metropolitan Traction Company, of New York City, in favor of some other system than the cable or overhead trolley now employed in Brooklyn and New York, and in a measure favoring an underground electric system, should stimulate designers of conduit electrical devices and call the attention of inventors to this field. Probably the conduit systems of electrical propulsion have as good a chance as any of getting the $50,000 premium that has been

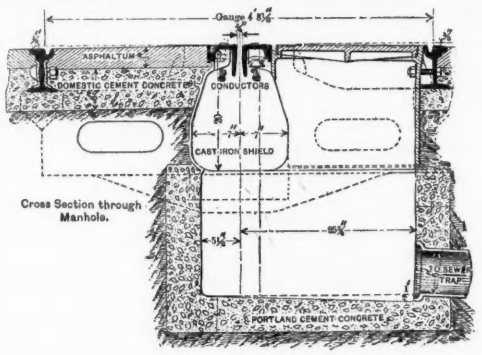


Fig. 1.

offered by the Metropolitan Traction Co. In the *Railroad Gazette*, 1893, page 818, was described briefly the Love system of electric conduit that received considerable attention at the Milwaukee meeting of the American Street Railway Association. Figs. 1 and 2 are cross-sections of the conduit, fig. 1 being a section at a manhole, and fig. 2 at a yoke and between yokes. The yokes are cast iron, 4 ft. distant from each other, and

weigh 260 lbs. each. As shown in the diagram they are mounted upon concrete foundations with concrete filling at the sides, the lining being also of cast iron. The rails are grooved and bolted directly to the yokes by X

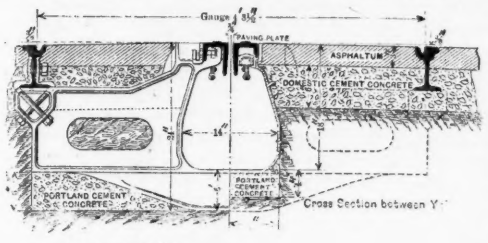


Fig. 2.

bolts shown in the diagram, fig. 2. The dimensions are given in the figures.

The essential and important features of this underground conduit are the inverted U shaped slot rails shown in the sections. One lip is longer than the other and the wire is placed between the sides of the inverted U, where it is protected from water, snow and other rubbish that may fall into the conduit. The manholes are located at every 100 ft. and each is drained by a 6-in. pipe. There are two conductors of hard drawn ⅜-in. copper wire which are supported by a special insu-

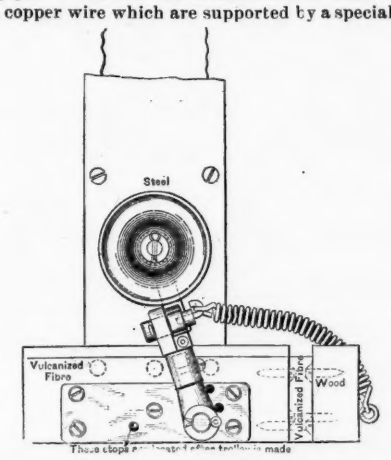


Fig. 3—Trolley.

lator which fully protects them from accidental grounding by water or other substances. The conductors are made of one continuous wire connected for 500 ft. by special couplings which allow for contraction and expansion. They are suspended from the yokes by special clamp insulators, shown in fig. 4, which fit into longitudinal grooves on each side of the wire conductors, thus leaving an uninterrupted surface on the under side of the conductor for the trolley wheel. A side elevation of the trolley is shown in fig. 3 and in its proper position in fig. 4. The trolley carries two wheels, one for each conductor, as shown in fig. 4. Each wheel is mounted

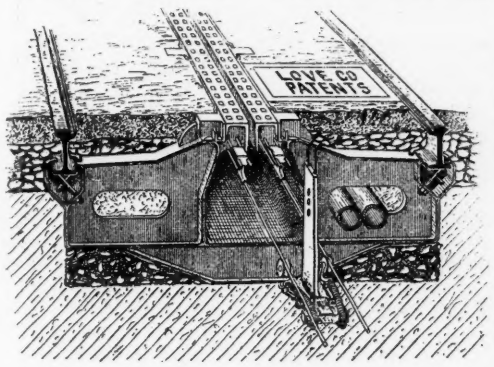


Fig. 4.

on a swinging bracket which is held against the conductor by a spring, which insures contact against the wire.

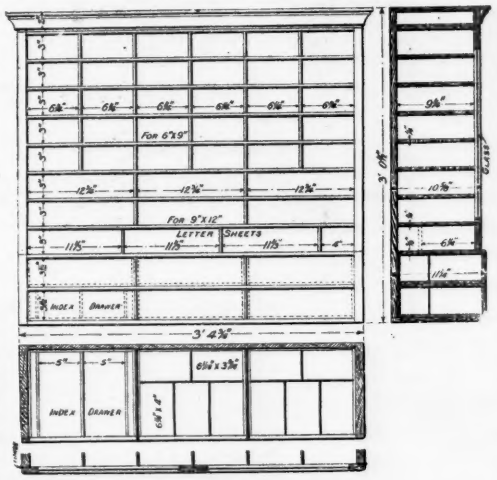
The Love system may be considered beyond the experimental stage at this writing, insomuch that the company has now two roads in operation which are giving entire satisfaction. They also claim contracts for the construction of several other lines to be in operation soon. There are many patents on conduit systems for electrical street railroads. Among the most prominent inventors are Bentley, Knight & Siemens. Remarks about the introduction of conduit systems and the cause of delay in their use will be found in the editorial columns.

Circulars of the Master Car Builders' Association.

Three circulars from the M. C. B. Association committees have just come to hand and more are expected.

The Committee on Freight Car Trucks wants to know if members consider it advisable to adopt standard sizes and shapes of arch bars and channel transoms for diamond trucks for cars of 60,000 lbs. capacity. They wish to know also the wheel base, the dimensions of arch bars, the rise of the top arch bar and the depth or set of the lower arch bar, the size of column bolts and the number recommended for each side of the truck. Inquiries are made as to the size of journal box bolts and the dimensions of channel transoms. An expression from the members is sought as to the advantages of the swing bolster over the rigid truck as to flange wear, roadway, or load carried, also their preference for the swing bolster truck for freight cars at the same cost of construction and maintenance. Members will have an opportunity to state what style of truck they consider the most practicable and economical to maintain, where they prefer to have the brakes attached and what their experience has been with iron and steel trucks. The Committee wishes to learn of any new designs of trucks and the experience of members with the later designs of wooden trucks for cars of 60,000 lbs. capacity. In conclusion the Committee invites any member who knows of any improvements in the parts of freight car trucks to call its attention to the same and to send a plan or sketch if possible. The Chairman of the Committee is Mr. J. J. Hennessey, C., M. & St. P. Ry., West Milwaukee, Wis.

The Committee on Lubrication of Cars and Prevention of Hot Boxes make inquiries as to the kind of lubricants in use, their cost in bulk and the cost per thousand miles of service; what special lubricants are used and how they are applied, and from the experience of members which they prefer and why, as well as the results obtained. It inquires if a record is kept of hot boxes and the number reported per thousand miles, and whether cotton or woolen waste is used and which has given the best results. The circular inquires what packing is used and its advantages over other materials, the grade of oil and waste and the quantity necessary to



Proposed M. C. B. Filing Case.

saturate a pound, and the time between renewals of packing. The Committee asks for any special designs of oil boxes or dust guards, and the advantages of them; the best materials for dust guards and for journal bearings, and the advantages of steel over iron axles in the avoidance of hot boxes. Personal examination is requested by master car builders of the standard journal bearings and wedges in use on their roads, to ascertain if they strictly conform to the standards, the mixture and percentage of metals used for passenger and freight journal bearings, and whether the bearings are self-fitting or filled shelled journal bearings, and the experience with the two styles named; also whether the solid journal bearings are bored or ground before lining. Information is sought as to the lining, its thickness, the proportions of metal used for lining, and as to data or experience of members as to the comparative freedom from heat when curved or straight back wedges are used. More technical information is sought as to what occasions heating of journals whether they commence heating at the front or back of the journal, if the same experience has been had with passenger and freight cars, as to the effect of the twist of an equalizer in causing unequal pressure on the top of the oil box, and how all such difficulties are overcome. The Committee wishes to know the influence of the use of power brakes in causing hot boxes, and the personal experience and results of observation that have come to members or their assistants.

This circular is an excellent one, and will afford a fund of valuable information *if the members answer*. The Chairman is Mr. A. M. Waitt, of the Lake Shore & Michigan Southern, Cleveland, O.

The Committe on Standard Sizes for Catalogues, etc., submits drawings and specifications for a filing case for the use of master car builders, in conformity with the dimensions heretofore printed in the *Railroad Gazette*. The accompanying illustration will tell the whole story. The Committee has been carefully over a large assortment of circulars and printed matter, and has also consulted with different technical associations, and submits the cabinet illustrated herewith as its recommendation to the Association. Mr. G. W. Rhodes, C. B. & Q., Aurora, Ill., is Chairman of this Committee.

Replies to these circulars are requested before Feb. 15, 1894, and every member of the Association should have received copies of the circular to be filled out and returned before that date.

Railroad Matters in Chicago.

Freight Traffic.—The past week shows, instead of the expected decrease, an unusually good business on in bound freight and the general aggregate of such business not only compared well with the week immediately preceding, but was much larger than for the third week in January last year. The marked feature as compared with corresponding periods in former years was the heavy movement of grain, the total deliveries at Chicago being 4,351,000 bushels, compared with 2,204,000 bushels the same time last year. The large movement last week was the more surprising because of the fact that liberal arrivals the preceding two weeks were claimed to be mainly due to the advantages which through shippers to the seaboard were obtaining, from the eastbound trunk lines on previous contracts for low freights. But such contracts are not supposed to have continued the past week. That they did not cut a material figure in bringing the grain forward is also shown in the increased arrivals of wheat which has not, since the close of lake navigation, gone out in any considerable quantities. It is likely that the favorable weather for delivering grain at interior shipping stations induced farmers to market their surplus stocks with more than ordinary freedom, and that an early abatement in such work may be looked for. The fact, however, remains that for the present the inbound business of the so-called Granger railroads is not shrinking as badly when compared with the same time one and two years ago as the majority of managers recently feared. The outward business was especially gratifying, as it included a large percentage of merchandise and other freight that pays the best rates. Estimates of fair earnings are largely based on the fact that business at all leading interior points outside of Minnesota and the Dakotas is showing an improvement equal to that observed at Chicago. Even the Western mining states are credited with a pronounced revival in the leading branches of trade and industry.

The following shows the deliveries of grain at Chicago by the leading Western railroads for the week ending Jan. 20 and the same time the three preceding years:

	1894.	1893.	1892.	1891.
C. & N. W.	785,000	380,000	625,000	561,000
Ill. Cent.	790,000	229,000	274,000	99,000
C., R. I. & P.	524,000	201,000	318,000	192,000
C., B. & Q.	1,033,000	710,000	555,000	203,000
C. & Alton	249,000	79,000	358,000	88,000
C. & E. Ill.	96,000	101,000	99,000	67,000
C., M. & St. P.	457,000	246,000	727,000	481,000
Wabash	159,000	54,000	29,000	47,000
C. & G. W.	91,000	54,000	61,000	86,000
A., T. & S. Fe	164,000	147,000	71,000	61,000
L., N. A. & C.	3,000	.....	3,000	.....
Totals	4,351,000	2,204,000	3,120,000	1,885,000

The deliveries of flour at Chicago by the leading Western railroads for the week ending Jan. 20 and the same time the three preceding years compare as follows:

	1894.	1893.	1892.	1891.
	Flour.	Flour.	Flour.	Flour.
	Bbls.	Bbls.	Bbls.	Bbls.
C. & N. W.	11,400	18,380	26,387	23,122
Ill. Cent.	.....	450	.....	.....
C., R. I. & P.	6,700	6,300	875	5,575
C., B. & Q.	6,555	10,849	13,100	19,350
C. & Alton	1,050	4,400	2,250	150
C. & E. Ill.	300	150	.....	.....
C., M. & St. P.	29,300	25,825	24,925	26,370
Wabash	450	1,050	790	650
C. & G. W.	10,606	12,906	29,905	.....
A., T. & S. Fe	.....	150	.....	125
L., N. A. & C.	.....	.....	.....	14
Totals	66,361	80,460	98,232	75,056

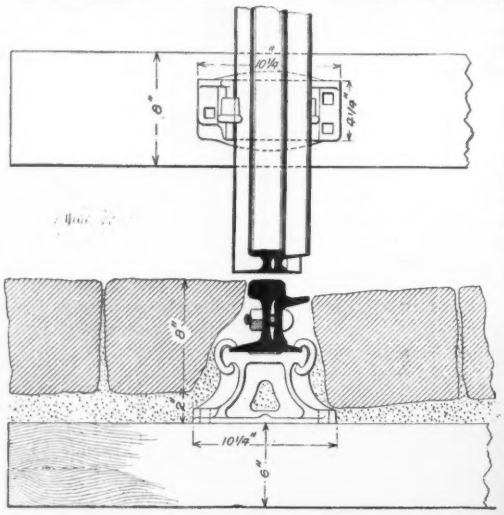
The deliveries of miscellaneous produce increased 7,744 tons over the third week in January last year and the live stock 70,200 head of hogs and 16,600 sheep, but cattle decreased 5,503 head. Reports from other leading points at which Chicago roads connect also show a large increase in the aggregate deliveries of grain and live stock.

Passenger Traffic.—Although passenger traffic was not on a commensurate scale with the movement in freight the increase over some of the leading Western lines was much larger than had been anticipated. The decision of the Passenger Association to shorten the time on excursion tickets where special rates are made for conventions and other meetings to a sufficient time for the excursionist to make the trip, instead of allowing 30 to 60 days, as has heretofore been the case, is regarded by all conservative railroad officials as a move in the right direction, as it closely confines the sale of such tickets to those who want them for legitimate purposes and keeps them out of the hands of scalpers. The new regulation, if continued, will of course be opposed by a portion of the members of the organizations who receive the benefit of special rates. The scalpers will also fight it. Speaking of the largely increased sale of mileage books the past week to commercial travelers, a prominent railroad official said: "There is little profit in such business, but the issuance of the tickets was inaugurated years ago, and we are merely following questionable precedent by continuing them. The suddenly developed demand, however, is encouraging, as it shows that manufacturers and jobbers are recovering from the scare that paralyzed trade a few months since, and are preparing to resume active operation."

CHICAGO, Jan. 22.

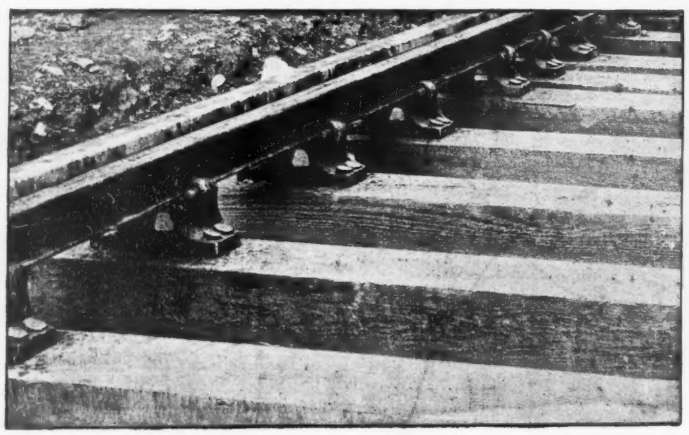
Standard Railroad Track for Stone Block Paved Streets.

We illustrate the new double track just completed by the New York Central & Hudson River in connection with a new first-class stone block roadway paving throughout the entire length of Washington street in the city of Syracuse, about 1⅛ miles in length. The peculiar feature is the iron tram-bar attachment to the

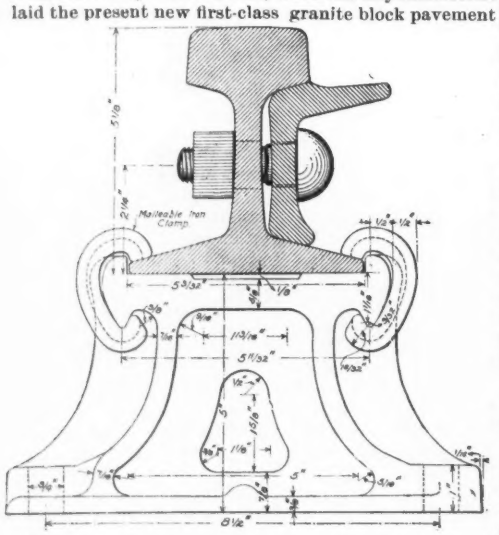


standard rail, converting it in effect into a street tram rail, affording all needed convenience for the street vehicular traffic, and adapted to stone block paving, after the type of girder rails by the use of cast iron raising chairs of a peculiar design, whereby all the advantages of the girder type of tram rail is obtained at much less cost. A girder type tram rail of a weight and strength adequate to properly sustain the loads of first-class standard rolling stock of modern times is found to be exceedingly costly, to save which and to retain the standard rail for the railroad traffic, while at the same time furnishing the necessary tram bar for the street traffic, Mr. Walter Katte, Chief Engineer of the New York Central Railroad, designed this type for standard railroad track in paved streets.

He first applied it to the tracks in New York on West, Canal and Hudson streets, between Ganzevoort



street and St. John's park, and also to the crossing of the railroad track at the intersection of Eleventh avenue and Forty-second street, when the city authorities laid the present new first-class granite block pavement



on those streets some years ago. The rail in these streets is 65 lb. per yard; that used in the Syracuse street is the New York Central new 80-lb. standard rail.

The device has proved very satisfactory in both places; the switches and frogs used in connection with it are mounted on cast raising chairs, the same as the rail is, admitting of the stone paving being very snugly fitted around them, as will be noticed in the photograph views. The hand lever for operating the switch is inclosed in a cast iron box, set in the paving, with a cover or lid flush with the paving, and only opened when the lever is to be used, thus causing no obstruction to driving over it when closed down in its normal state. The switches and raising chairs were supplied by the Burnham & Duggan Railway Appliance Co., of Boston, the switch being the Duggan patent.

Switch Lever Box with Flush Lid.

STANDARD TRACK FOR STONE-PAVED STREETS.

Some Thoughts on Ferry-Boats.*

Mr. Stevens begins his article by comparing the ferry-boat of to-day, not only in its functions, but in construction, to a bridge. He says there is no question but that the ferries of New York are and will be for many years the most important of the world, and that the bridging and tunneling of her rivers will not seriously affect the business of her ferries nor endanger New York's leadership in that branch of transportation.

He sets forth the requirements and limitations of a ferry-boat briefly as follows: The hull must have rigidity to carry its shaft in line, longitudinal stability to resist burying with a large load on the bow, good steering qualities even when trimmed by the head, fair maneuvering power, capacity to carry heavy team loads without straining, good shape to fight ice, small weight, not more than 11 ft. draft and stability enough for safety and no more.

The engine must start and reverse quickly, be capable of great variations of power without sacrificing economy; its balance should be good and, above all, it must be simple, strong and easy of operation, repair and inspection. The boilers should be free from priming, be able to meet the varying demands and have capacity to store steam. The auxiliary machinery named consists of an air pump, a circulating pump, a feed pump, a fire and bilge pump, steering engines, electric light engines and dynamos, and an engine and fan for ventilating and blowing heated air into the cabins.

He describes two classes of boats, the paddle-wheel and screw propellers. In comparing the engines he says: The paddle-wheel engines have the objection of not stopping the vessel as efficiently as the screw. They take up a large deck space both for the engines and for the wheels. They allow the vessel to be more easily steered when fore-reaching, but at a loss in maneuvering power at low speeds, especially when starting. The beam engine has great simplicity, is economical in first cost and, in ferry service even at the present day, in coal consumption. The necessity of balancing the vessel forbids the placing of the wheels on the midship section. In consequence, the ends of the boats are apt to steer differently. Paddle-wheel engines give a burying moment from the high position of the shaft, and the effect of this is exaggerated when the vessel is heavily loaded by the head, resulting in a loss of maneuvering power.

On crowded ferries the paddle-wheel must give way to the propeller. Screw propeller vessels of New York have a rigid shaft running from end to end of the vessel, driven by one or two engines with a screw at each end. Vessels have been driven on the Mersey with four screws, two on each side, attached to rigid through shafts. These vessels are said to have great maneuvering power, but are very small compared to the New York boats. The screws, under the twin-screw arrangement, would be more exposed to damage by ice and floating wreckage, and the machinery is more complicated. Prompt reversing has led to the adoption of two engines with the object of securing two high pressure cylinders with crank pins at right angles to each other. The need of this arrangement would hold good with twin screws and would involve complication.

The first screw boat built for New York was the Bergen, of the Hoboken ferry, and the troubles prophesied for her never happened. Her shaft stayed in line and did not heat in the bearings; it has not yet broken, nor did she break propeller blades in ice; she did stop quickly and, in fact, most promply. She has proved herself in service a successful and popular vessel. But she had her faults. It is regrettable that other vessels had not the benefit of the Bergen's experience.

How the Bergen's shortcomings were met in subsequent boats was shown by a comparison with the Netherlands, a boat just completed. The beam of the Netherlands, both at the gunwale and at the low water line, is greater than the Bergen's, she is fuller in the garboards, and the system of framing is quite different. The Bergen's stability, while ample for a single deck vessel, is not enough for double decking. The increased beam at gunwale shortens the overhang of the guards, while the increased flare of the side decreases the risk of damage below the water-line in the case of collision. The Netherlands is fuller in the ends of her upper body, insuring greater longitudinal stability, and her lines show more power with a fairer form. The most marked change is in the greater "cut-out" at the ends. The distance between the stems and sternposts in the Bergen is 11 ft., in the Netherlands 16 ft. This "cut-out" is to increase the breadth of the rudder and to permit the use of a three-bladed propeller of 11 ft. pitch, instead of a four-bladed one of 9 ft. 3 in. pitch in the Bergen.

* Abstract of a paper by Col. Edwin A. Stevens, read at the New York meeting of the Society of Naval Architects and Marine Engineers.

The usual construction of decks of ferry-boats is platforms resting on and overhanging the hull, and held down by bolts at the gunwale. But in the Netherlands steel bulb angles, spaced about 8 ft. apart, were used for the main deck-beams, and were bent down so as to go under the lodger plate in the usual fashion. Between the coamings in the team gangways these beams were covered over with a system of bridge plates, producing a corrugated section. The corrugations are filled on the upper side with white pine nailing strips laid in a waterproof mixture. To those nailing strips the sheathing necessary for the safe handling of team traffic is attached. The iron deck beams have a firm attachment to the upper chord of the bulkhead structure, which carries a heavy longitudinal plate, forming the upper member of the longitudinal girder. The deck beams for the passenger space are of white pine; they foot on this longitudinal plate, and are firmly attached thereto.

These beams serve the double purpose of carrying the passenger load and of acting as struts to hold the guard structure in its position, but they require no such strength as would be required for deck beams under the deck. The saving in weight is very considerable, and the trough sections running fore and aft are a very valuable feature in the longitudinal strength of the hull The longitudinal bulkheads of the Bergen are intended mainly to subdivide the hull. In considering the stresses to which the structure was subjected, it appeared advisable to make further use of these bulkheads to secure longitudinal strength. In the Netherlands the bulkhead construction is carried to the deck by means of vertical and diagonal angles.

The sections of the Netherlands, as a whole, are those of a deck truss bridge; the longitudinal bulkheads and their continuation form the trusses; the bottom is formed by the bottom of the vessel, and the deck by the deckbeams and trough sections. The spaces in the wings beyond the longitudinal bulkheads were treated merely as buoyancy chambers requisite in the service for which this peculiar bridge was designed. The passenger decks may be considered much in the light of a covered passenger platform, bracketed to the side of the truss bridge. The necessity for providing for collisions with ice and other vessels insures more than sufficient strength for any other purpose.

The Netherlands' engines are two compound 18 and 38 by 28 in. stroke. The stroke was taken on account of the advisability of an increased pitch of wheel. The two compounds were substituted in the Netherlands for one triple of the earlier types of engines to make an engine that would reverse more promptly, and in spite of the increase of pitch of the screw; this object was attained. Formerly when the high pressure crank happened to stop on the center the engine failed to reverse as promptly as desirable, and the certainty that a vessel will back promptly and effectively is of importance. When the four-cylindered compound type of engine was first considered, it was adopted partly on account of the supposed gain in balance that it would bring. The result, however, has demonstrated in a very practical way the difference between a statical and dynamical balance.

The boilers of the Netherlands are, like those of the Bergen, of the "Admiralty" or "gunboat" type. In the Netherlands, however, in order to induce a stronger draft in the lower portion of the boiler, two flues of 6 and two of 8 in. in diameter were worked below the tubes. This was found to draw down heated gas and secure a more even temperature. The boilers of the Netherlands are slightly larger and stand a pressure of 140 lbs.

Some small refinements may prove of interest. The whistle can be blown automatically in a fog so as to give the signal customary for the Hoboken ferries. There is also in the pilot house an electric gear for starting, stopping and reversing the engines of the vessel directly from the pilot house, but it has not been sufficiently tried in actual service and must for the present be regarded as more or less experimental. These latter devices are designed by Dr. Chas. E. Ongley.

Colonel Stevens then points out the directions in which improvement may be looked for in the construction of this type of vessel. The weights and proportions of the scantlings and plating of the hull have heretofore been laid down mainly by empirical conditions. There is unquestionably room for saving in certain directions if the exact stresses are accurately determined. The difficulty, however, lies in the determination of these stresses and in the necessity of providing for the severe racking due to heavy moving loads. In figuring the strength of the hull for ferry-boats it has often been found that where experience of older boats has been relied upon too closely the resulting construction has not been able to keep pace with the increasing strains to which it has been subjected. The weight of teams has increased, and the limit of load has not yet been reached. A team load may vary from a battery of boilers to a single horse and buggy.

While the obstruction of ice is less on account of the amount of traffic in the harbor, the regularity of service requires hulls that can be forced through any ice in a way which would have been impossible with older boats. The condition of providing a foundation for the long, rigid shaft reaching from end to end of the vessel will not allow of any great reduction with a proper margin of safety. Any changes in the propelling apparatus would affect the design of the hull. In regard to the engine and machinery, the need of great simplicity and strength is of prime importance. Prompt reversing together with the foregoing requirements, forbids the consideration of any universal joints in the line of shafting and demands two high pressure cylinders. If, therefore, two independent shafts are to be used two engines are necessary, and, in order to secure prompt backing, at least three cylinders for each engine, involving multiplicity of parts, unless single expanzion engines be used. Whether the economy of multiple expansion engines is sufficient to offset this objection, and whether the greater simplicity of a single expansion engine with two cranks set at 90 deg. apart would compensate for its waste of steam are questions for discussion. The compound engine of the Netherlands might be improved by combining the two low-pressure cylinders into one and by more careful balancing.

In the arrangement of the hull of a ferryboat the smokestack should be placed at the back end of the boiler, which gives a symmetrical exterior by bringing the smokestack near the midship section. The sudden and frequent variations of power call for a large water surface and ample storage of power in case shell boilers and natural draft are to be used. On the Netherlands the gunboat type has been used, with an independent steam drum placed between the two boilers. While the drum is not to be recommended for economic reasons, its advantages as a storage space justify its use in a ferry service. Speaking of water tube boilers for ferry-boats, Colonel Stevens says: "I have given much consideration to their use. The saving in weight of the boiler is an advantage not to be despised. The trouble has been to provide, with due regard for simplicity, a plant that will be sufficiently elastic. My own belief is that, with a suitable design of boiler and a proper adjustment of forced draft, these conditions can be met. The problem is a difficult one. In the arrangement of the auxiliary plant a greater simplicity is not only desirable but also necessary. "He described also a plan for working the auxiliary machinery by hydraulic power, using a modification of the present combined air and circulating pump, built by the G. F. Blake Co., as a prime motor, as well as for its present purposes. The only other auxiliary would be the donkey pump and the injector. How far the waste in converting the power of steam into water under pressure and reconverting the latter into power by means of Pelton wheels and hydraulic rams would offset the losses incident to a large number of small motors is a point admitting of a difference of opinion. The gain in simplicity and repairs is unquestionable, provided the plant be properly designed.

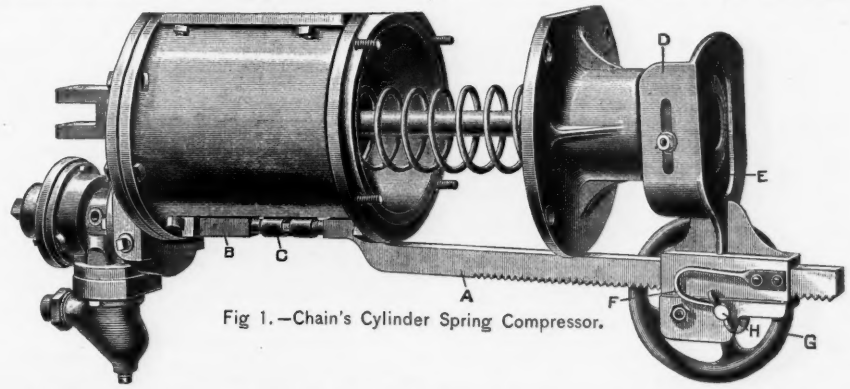
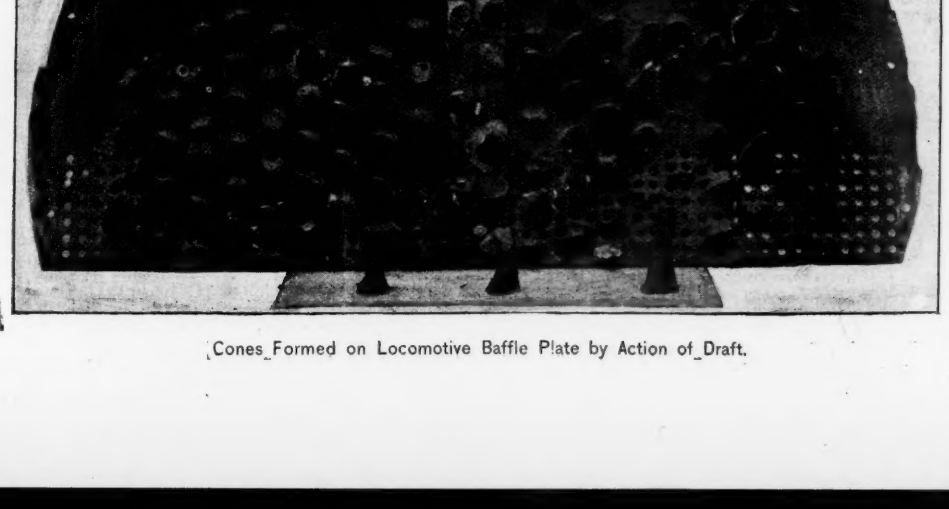


Fig. 1.—Chain's Cylinder Spring Compressor.

Cones Formed on Locomotive Baffle Plate.

It frequently happens that a locomotive will run for months, making steam very freely and giving general satisfaction, and then a report comes in that it will not steam well. A search is probably made for a hole in the smokebox, or it is concluded that the firebox and tubes are badly coated with scale. Although cones have been found on the baffle plate it is seldom thought necessary to examine this plate for causes of failures for steam.

The illustration was made from a photograph of a baffle plate which was removed from a "bad steaming" locomotive. Some of the cones near the upper part of the plate were 7 in. long and reached nearly into the tubes. Some of the longer cones were broken off and stood on end at the bottom of the plate when the photograph was taken; the dark background of the plate, however, prevented them being clearly shown. With some kinds of coal the cones form quite rapidly on the plate directly opposite each tube, while with other kinds of coal no such formation occurs. The locomotive from which the plate was taken runs into Ottumwa Ia., and used a very soft coal.


Cones Formed on Locomotive Baffle Plate by Action of Draft.

Brake-Cylinder, Packing-Former and Spring-Compressing Device.

The engraving shows a useful mechanism for compressing the release springs of a brake cylinder. It consists of a rack bar *A*, with one end, *B*, extensible, so that it can be firmly adjusted between the flanges of the cylinder as shown in the diagram fig. 1. This extension is accomplished by a right and left threaded turnbuckle, *C*. The ends of this extensible member are provided with hardened steel center points, so that slight pressure on the turnbuckle will make it very rigid to the cylinder. The cylinder head is held in position by a movable head, *D*, which is provided with an adjustable center-rest, *E*, which may be raised or lowered to suit the size of the cylinder. A pinion gear runs on the rack bar A, which is rigidly connected to the movable head *D*. The pinion is operated by means of a crank or hand wheel, *G*, and as the head is moved toward the cylinder the spring is compressed. A locking device is provided which consists of a pawl which locks the pinion gear and is operated by the spindle *H* and spring *F*. This locking device gives the workman the use of both hands to bolt the head to the cylinder when the spring is sufficiently compressed. This device renders a very difficult operation, that of compressing a very stiff spring into a cylinder, an easy task and is a device that would be greatly appreciated by car repair men.

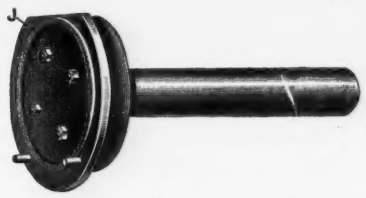


Fig. 2.—Chain's Piston Packing-Former.

Another device invented and controlled by the same party is shown in fig. 2, which is a piston packing-former. This consists of a funnel-shaped ring, one end of which is of the same diameter as the bore of the cylinder, and the other end of sufficient size to admit the piston packing before it has been formed to the size of the cylinder. The wedging action on the packing as it is forced into this funnel compresses it to the necessary size. There is no apparent reason why the same device

that is used to compress the spring may not also be used to force this piston into the packing-former.

These devices have received favorable notice from the Westinghouse and New York air-brake companies and from officers of the Boston & Albany road. The patentee and manufacturer is Mr. Elmer E. Chain, Box 1176, Boston.

Train Accidents in the United States in December.

COLLISIONS.

REAR.

2d, 4 a. m., on Lehigh Valley road, at White Haven, Pa., a freight train broke apart in three places at the foot of a grade, and the rear portion, which was stopped, was soon afterward run into by a following freight, making a very bad wreck, which at once took fire. The fire spread to a hotel near by, which, with several other buildings, was burned down. The total loss was estimated at $200,000. It is said that the foremost train broke apart in consequence of the inexperience of the trainmen, the engineman and brakemen not working together when steam was put on at the foot of the grade. Three trainmen were killed in the wreck.

3d, 4 a. m., on Lehigh Valley road, near Mehoopany, Pa., a freight train ran into the rear of a preceding freight, wrecking the caboose, which took fire and was burned up; conductor and one brakeman injured.

7th, on Philadelphia, Wilmington & Baltimore, at Stanton, Del., a freight train broke in two and the rear portion afterward ran into the forward one, wrecking several cars, which fell down a bank. A tramp was killed and two others injured.

11th, on Lehigh Valley, near Coxton, Pa., a locomotive carrying a physician to see a distressed employee ran into the rear of a preceding freight train and was overturned. The physician and one employee were injured.

11th, on Forth Worth & Rio Grande, near Proctor, Tex., a freight train descending a grade broke in two, and the rear portion afterward ran into the forward one, doing considerable damage. The conductor was thrown out of the caboose and fatally injured.

13th, 2 a. m., on Lehigh Valley, at Chain Dam, Pa., a freight train ran into the rear of a preceding freight, derailing the caboose, which took fire and, with several cars, was burned up. "The engine was thrown on its beam ends." Fireman and three brakeman injured.

15th, 5 p. m., on Manhattan Elevated, at 149th street and 8th avenue, New York City, a passenger train ran into an empty engine, pushing it against the rear of another passenger train further forward, damaging the rear passenger car and breaking a good many windows. Both of the engines involved were derailed and 1 brakeman was injured. There was a dense fog at the time.

16th, 8 a. m., on Manhattan Elevated, at 135th street and 8th avenue, New York City, a passenger train which had stopped between stations was run into at the rear by a following passenger train, and the engine and 2 cars were damaged. It is said that this part of the road is equipped with automatic block signals, but that the engineman ran past a signal which was against him.

19th, 9 p. m., on Cleveland, Cincinnati, Chicago & St. Louis, at Sedamsville, O., a yard engine pushing a train of freight cars ahead of it was run into at the rear by a freight train and badly damaged. Three trainmen were injured.

20th, 2 a. m., on Lehigh Valley, at Homet's Ferry, Pa. a passenger train just starting from the station was run into at the rear by a milk train, and the rear car, a sleeper, was badly damaged. One passenger was injured.

20th, 4 a. m., on Louisville & Nashville, at Beaucoup, Ill., a freight train standing at the station was run into at the rear by a following freight, damaging the engine and several cars, which took fire and were burned up. The fireman of the foremost train was under the engine at the time and was badly injured.

23d, on Birmingham & Atlantic, at Renfroe, Ala., a mixed train descending a grade broke in two, and the rear portion afterward ran into the forward one. Several passengers and the conductor were injured, the latter fatally.

23d, on Pennsylvania road, near Cornwell's, Pa., a freight train ran into the rear of a preceding freight, wrecking 3 cars and injuring 3 trainmen. There was a dense fog at the time.

27th, on Cape Fear & Yadkin Valley, near Egypt, N. C., a freight train descending a grade broke in two and the rear portion afterward ran into the forward one, damaging several cars. A brakeman was killed.

27th, on Norfolk & Western, near Roanoke, Va., a passenger train ran over a misplaced switch and into a freight train standing on the sidetrack. The engine and 2 freight cars were wrecked; engineer, fireman and 1 passenger injured.

28th, on Lehigh Valley, at Laury's, Pa., a freight train ran into the rear of a preceding freight, making a bad wreck. The engineer was injured. It is said that the flagman of the foremost train neglected to go back when his train stopped.

And 24 others on 14 roads, involving 8 passenger and 31 freight and other trains.

BUTTING.

1st, on New York Central & Hudson River, near Cayuga, N. Y., butting collision between a passenger train and a freight, damaging both engines. One passenger jumped off and was injured. It is said that the engineman of the freight was new to that division and encroached on the time of the passenger train.

7th, on Great Northern, at Edwall, Wash., butting collision of freight trains; one engineer and one fireman were injured and burned to death and three other trainmen were injured. The fatal fire was due to the explosion of a car of oil in the train; 20 cars were burned up.

8th, midnight, on Northern Pacific, near Boulder Mont., butting collision between two Montana Central freight trains, each drawn by two engines. All of the engines and several cars were badly damaged.

9th, on Wabash road, at Oak Lawn, Ill., butting collision between a passenger train and a freight; fireman and two passengers injured. It is said that the freight was running on the time of the passenger train.

13th, on Chicago, Rock Island & Pacific, at Steinauer, Neb., an eastbound freight train standing on the main track was run into by a westbound passenger train, damaging the engine. The passenger conductor was injured.

14th, on Colorado Midland, near Arkansas, Col., butting collision of freight trains, injuring 1 engineer.

15th, on New York, New Haven & Hartford, near Providence, R. I., butting collision between two trains of the New York & New England, a southbound passenger and a north bound freight. Both engines and several freight cars were wrecked. Three trainmen and 4 passengers were injured. The wreck took fire, but the city fire department extinguished the flames.

16th, on Seaboard Air Line, at Comer, Ga., butting collision between a passenger train and a freight, on a high trestle bridge, damaging both engines and several freight cars. Five trainmen and 2 passengers were injured. It is said that the conductor and engineer of the freight overlooked a telegraphic order.

20th, on Richmond & Danville, at Graniteville, S. C., a passenger train ran over a misplaced switch and into the head of a freight train standing on a side track. Both engines were damaged and three freight cars wrecked; 4 trainmen and 1 passenger injured.

23d, on New York Central & Hudson River, at Marcellus, N. Y., butting collision of passenger trains, damaging both engines. Three mail clerks were injured.

31st, on Chesapeake, Ohio & Southwestern, near Greenville, Ky., butting collision of freight trains, one of the trains having disregarded a telegraphic order. One brakeman was killed and one engineer was badly injured by jumping upon a barbed wire fence.

And 4 others on 4 roads, involving 8 freight trains.

CROSSING AND MISCELLANEOUS.

2d, on Pennsylvania road, at Broad street, Philadelphia, an incoming passenger train was by mistake turned upon a trainshed track which was already occupied by some empty passenger cars; the engine struck these with considerable force and 2 passengers and 1 trainman were injured.

2d, on Lehigh Valley road near Bloomsbury, N. J., an empty engine ran into the rear of a preceding freight, doing considerable damage. The engine was not derailed, however, and having been reversed and deserted, ran back to Phillipsburg, where it struck an inspection engine. The latter remained on the track and both engines ran across the Delaware River to South Easton, where an eastbound freight train was run into. The inspection engine was wrecked.

5th, on Cincinnati, New Orleans & Texas Pacific, at Sherman, Ky., a freight train entering a side track at a meeting point was run into at the side by a freight approaching from the opposite direction at uncontrollable speed and 1 engine and 2 cars were ditched and a fireman injured. It is said that the approaching freigh disregarded a stop signal.

9th, on Chesapeake & Ohio, at Edgehill, Va., a passenger train entering a side track was run into before it had cleared the main track by another passenger train from the opposite direction. One car was wrecked, express messenger and mail agent injured.

13th, 10 a. m., on Pennsylvania road, at Nanticoke, Pa., a passenger train collided with a switching engine at work on the main track, badly damaging both engines and several cars. Nine passengers and three trainmen were injured. The conductor of the switching train forgot to send out a flag

14th, 2 a. m., on St. Louis, Iron Mountain & Southern, at Little Rock, Ark., a passenger train standing in the station was run into by a yard engine which came down a grade at uncontrollable speed. Both engines were badly damaged and the passenger conductor injured.

19th, 7 p. m., on Baltimore & Ohio, near Bessemer, Pa., a yard engine of the Carnegie Steel Company ran into passenger train No. 3, overturning a passenger car which fell into Turtle Creek. Seventeen passengers were injured, 2 of them probably fatally. Fire started in one of the wrecked cars, but it was soon extinguished. A flagman was jailed on the charge of giving a wrong signal to the yard engine.

22d, on Philadelphia, Wilmington & Baltimore, at South street, Philadelphia, a passenger train ran into some freight cars on a cross track which fouled the main track, doing considerable damage. The engineer was injured.

29th, on Pennsylvania road, near Ebensburg, Pa., collision between a passenger train and a freight, injuring 3 passengers and 2 trainmen.

29th, on Lehigh Valley, at Penn Haven Junction, Pa., a freight train passing from a siding to the main track was run into by another freight train which approached at uncontrollable speed, making a bad wreck. One brakeman was injured.

30th, on Ohio Southern, at Quincy, O., collision between a passenger train and a mixed train, killing 1 engineer and 1 fireman.

And 18 others on 12 roads, involving 9 passenger and 22 freight and other trains.

DERAILMENTS.

DEFECTS OF ROAD.

8th, on Southern Pacific, near Lordsburg, N. M., a passenger train running at good speed was derailed at a bad joint and some of the passenger cars were overturned; 37 passengers were injured.

15th, 6 p. m., on Western New York and Pennsylvania, near Dunkirk, N. Y., a passenger train consisting of an engine and 3 cars fell through a trestle bridge into Herrick's Creek, badly damaging the cars. The engine ran nearly across the bridge and fell down the embankment. There were but few passengers on the train. The conductor, baggageman and 3 passengers were killed and 4 passengers and 2 trainmen were injured. Some of the legs of the trestle had been undermined by a freshet.

21st, 1 a. m., on Louisville & Nashville, near Beaucoup, Ill., a freight train running on a temporary track laid around a wreck was derailed at a defective switch and the engine overturned. A brakeman jumped off and was badly injured.

21st, on Central of Georgia, at Echeponnee, Ga., 8 cars of a freight train were derailed by a broken rail and the caboose was overturned, injuring the conductor. Fire started from the stove and a part of the wreck was burned up.

26th, on Northern Pacific, at Mandan, N. D., a car in passenger train was derailed by a broken rail and 3 passengers injured.

And 11 others on 10 roads, involving 5 passengers and 6 freight and other trains.

DEFECTS OF EQUIPMENT.

6th, on Concord & Montreal, near Suncook, N. H., a passenger train was derailed by the breaking of an axle of the baggage car. The baggage car was overturned and one passenger car fell down a bank. The baggageman was injured, but the passenger car only contained two passengers, who were only shaken. The baggage car took fire, but the flames did little damage.

14th, 11 p. m., on Allegheny Valley road, at Manorville, Pa., a freight train was derailed by a broken axle, wrecking 17 cars. The engineer jumped off and was badly hurt by a barbed wire fence.

21st, on Philadelphia & Reading, near Phoenixville, Pa., a southbound freight train was derailed by a broken axle and several cars fell upon the adjoining main track. A northbound freight train ran into the wreck and altogether about 15 cars were broken up, and some of them fell down a high bank into the Schuylkill Canal. One brakeman was injured.

And 12 others on 11 roads, involving 1 passenger train and 11 freight and other trains.

NEGLIGENCE IN OPERATING.

6th, on Norfolk & Western, near Maybeury, Va., the front portion of a freight train, which had broken away from the rear portion and was therefore being run at very high speed, was derailed and the engine and 12 cars piled up in a very bad wreck. The engineer and fireman were killed and the brakeman injured.

8th, on Lehigh Valley, at Jersey City, N. J., a coal train of 11 cars being pushed toward a car float lying in the Hudson River, was allowed to run too fast and went overboard, the coupling being broken when the brakes were suddenly applied on the engine.

8th, on Atlantic City railroad, at Camden, N. J., a switching engine backing toward the river at a point where cars are transferred to and from boats, became uncontrollable and went off the end of the track into the Delaware River. The engineman went down in the cab and was nearly drowned.

And 2 others on 2 roads, involving one passenger train and 1 freight train.

UNFORESEEN OBSTRUCTIONS.

2nd, on Manhattan Elevated, sixth avenue line, near Park Place, New York City, the engine of a passenger train running slowly upon a sharp curve was derailed by a bundle of newspapers which had fallen upon the track and had become wedged between the guard timbers. The engine ran about 20 ft. after leaving the rails.

6th, on New York, New Haven & Hartford, at Bethel, Conn., the engine and five cars of a freight train were derailed at a misplaced switch and badly damaged. It is said that the switch was misplaced by a carriage attached to a runaway horse.

8th, on Great Northern, near Belton, Mont., a passenger train was derailed by a landslide and the engine and first two cars fell down a bank. Several trainmen were injured.

9th, on Raleigh & Augusta, at Pine Bluff, N. C., a freight train was derailed by a maliciously misplaced switch, and the engine and 5 cars were badly damaged. The fireman was injured.

11th, on Burlington & Missouri River near Newcastle, Wyo., a passenger train was derailed by three head of cattle, which were struck by the engine and thrown against the bank, so that they fell back under the wheels of the cars. The hind car broke loose, and the rest of the train ran a long distance before it was stopped. The roadmaster and several passengers were injured.

11th, on Union Pacific, near Georgetown, Col., the engine of a passenger train was derailed by sand which had drifted upon the track, and afterwards was covered with snow. The engine was overturned, and the engineer badly injured.

15th, on Pennsylvania road, at Bamford, Pa., a passenger train running at good speed was derailed by a rock which had fallen upon the track, wrecking 1 passenger car and badly damaging the others. The conductor and 15 passengers were injured.

22d, on Norfolk & Carolina, at Roanoke Cut, Va., the engine and 18 cars of a freight train were derailed and wrecked by running into a landslide. The engineer was killed and the fireman and 2 brakemen injured.

28th, on Southern Pacific, at McDonough, Tex., a freight train was derailed at a switch which had been maliciously pried open, and 6 cars were wrecked. The engineer, fireman and a brakeman were injured.

30th, on Northern Pacific, near Elkhorn, Mont., a freight train was derailed by running into a snow bank and the engineer, fireman and 1 brakeman were badly injured.

And 3 others on 3 roads, involving 1 passenger train and 2 freight trains.

UNEXPLAINED.

1st, on Lehigh Valley, at Sayre, Pa., a freight engine was derailed and the engineer scalded.

10th, on Richmond, Fredericksburg & Potomac, near Hamilton, Va., the caboose of a freight train was derailed and the conductor and two brakemen injured.

12th, on Concord & Montreal, near Bethlehem Junction, N. H., a passenger train was derailed and the engineer and fireman injured.

17th, 9 a. m., on Chesapeake, Ohio & Southwestern, at Muldraugh, Ky., a freight train was derailed and 13 cars were wrecked, some of them falling down a very high bank. A large number of cattle and hogs were killed. The engineer, fireman and a man stealing a ride were killed, and 2 brakemen and 2 tramps were injured.

19th, on San Antonio & Aransas Pass, near Winchester, Tex., a passenger train was derailed and badly wrecked. The newsboy was killed and 5 passengers were injured.

21st, on West Virginia & Pittsburgh, near Weston, W. Va., the caboose and one car of a freight train were derailed and fell down a bank. The caboose took fire from the stove. Of the three trainmen who were in it, one was injured, one put out the fire and the third went back with a flag.

23d, on Duluth, South Shore & Atlantic, near Kroll, Mich., a freight train was derailed on a bridge and three cars fell through, making a bad wreck. The engineer jumped into the river, 65 ft. below and was fatally injured.

27th, on Duluth, South Shore & Atlantic, near Trout Creek, Mich., a freight train was derailed and the engine and six cars fell down a high bank. The engineer was killed.

And 20 others on 18 roads, involving 3 passenger and 17 freight and other trains.

OTHER ACCIDENTS.

4th, on Texas & Pacific, near Eastland, Tex., the engine of a freight train was wrecked by the explosion of its boiler; engineer, fireman and 1 brakeman killed.

7th, on Fitchburg road, at Baldwinsville, Mass., the engine of a freight train was wrecked by the explosion of its boiler; engineer and fireman injured.

26th, on Norfolk & Western, near Nace, Va., the roof of a car in a freight train was blown off by a high wind while the train was on a trestle 90 ft. high, and a brakeman who was on the roof fell with it to the ravine below, and was killed.

And 2 others on 2 roads, involving 1 passenger train and 1 freight train.

A summary will be found in another column.

Notes of Recent Legal Decisions.

Contractor and Engineer.—The question as to just what a contractor is to do when a dispute arises between him and the engineer or company as to what work is or is not within the contract, or as to how certain work shall be classified, executed or finished, is a most perplexing one. In a recent opinion of the Court of Appeals[1] of New York, Judge Peckham is reported to have advised that when a contractor is required to do work which he considers outside of his contract, and extra work, he should ask for the final certificate before performing what he claims to be extra work, and that if the certificate is withheld he could then call upon the courts to determine whether or not the work was called for by the contract. The judge saw about as far as the four corners of the courtroom when he gave that advice. In most cases probably the completion of the rest of the work which is required to be done before a final certificate can be demanded would require that the extra work should be done first. And the judge would find, when the case came before the court, that the contract had made the engineer the sole arbiter in the case, and that the courts had nothing to do but to sustain his decision or award.

Some recent decisions are instructive on this point. In a contract which provided that "at the end of the work, the engineer should certify the quantity and character of the work done and that the contractor should be paid according to such certificate," to obviate any disputes as to the measurement of certain excavations the engineer told the contractor he would classify certain work to be done as "75 per cent. solid rock," with which arrangement the parties expressed themselves as satisfied. There was no intention to make or consent to any arrangement outside of, or inconsistent with, the written contract. After the work was finished the engineer, in his final certificate, failed to adopt the classification promised, and it was held that the final determination of the engineer was binding on the parties, and the contractor must accept what the final certificate allowed him independent of the engineer's promise. But had the arrangement been between the company and the contractor, and in the form of a collateral or subsequent agreement, the decision must have been different and the contractor have recovered for "75 per cent. solid rock."

This case and the other one just cited also show conclusively that the authority of an engineer is limited to the powers and duties conferred by the contract. He cannot order extra work on behalf of his company nor promise beforehand any particular classification. Thus, when put in charge of construction, as inspector, he has no authority to permit deviations or changes in plans approved by the department by which he is employed.[3]

If, however, the company has permitted its agent to make purchases or order things done, and the contractor has, on the faith of his having proper authority, supplied materials and work for a long time, it seems that the company cannot afterwards abrogate a contract on the ground that such agent did not possess such authority in fact.[4]

Within the terms of the contract and the powers conferred by it upon the engineer, his decision is final and conclusive when it is so stipulated and his decision or certificate is made a condition precedent to payment for the work. Thus, if a contract provides that the price shall only be payable "after a certificate of approval shall have been issued," the contractor is bound by it, and cannot sue for the price without first obtaining the certificate of approval, unless it be arbitrarily or unreasonably refused.[5]

If, however, the certificate is refused on account of conditions over which the contractor has no control, and which are entirely within the control of the company, it will not prevent the contractor from recovery.[6]

What constitutes an arbitrary and unreasonable refusal is illustrated in a case where an owner promised to pay "if the work should be approved by myself and the architect." The contractor left the work unfinished, but lacking very little work to complete it. The contract provided that if the contractor refused to supply material and workmen, the owner could supply the same and complete the work according to the contract. In a suit by an assignee of the contractor who had sent a written notice to the owner urging and requiring him to complete the contract and to pay the balance due the contractor into court, it was held that a failure to do so within a reasonable time amounted to fraudulent conduct. And, furthermore, that it was not necessary to allege that the owner had given the three-days notice to the contractor required by the contract, or that he had had an opportunity to serve such a notice, neither to allege that the buildings had been completed to the satisfaction of the architect.[8]

Another case recently decided also holds that when a building contract provides for payments *only* on certificates of the architects that payments are due, it does not prevent recovery by the builder if he has fully performed the contract and the architect refuses his certificate without sufficient cause.[7]

The cases usually hold, however, that the architect's refusal must amount to a fraud or collusion with the owner, or be clear evidence of bad faith.

The fact that the award of the architect or engineer is excessive cannot be considered by the court as an objection to it, in the absence of a showing of corruption or partiality on the part of the engineer or of fraud in the company. And the mode of making the award or of investigating the case is not a ground for setting it aside, unless it shows corruption or partiality.[8]

A question that often arises is, "What constitutes a submission to the decision of an engineer as an arbitrator?" In a contract for the purchase of machinery by a railroad, it was recited that "if a satisfactory price cannot be agreed on between the parties, each shall select an arbitrator, and these shall select a third, who shall fix the price of the machines and whose decision shall be final." It was held that this was a submission to arbitrator, and not a stipulation for a mere appraisal.[9]

So an award which is not the result of the judgment of the engineer, but is based on an agreement between one party and the engineer even though authorized by the other party, is not binding if the consent of one party was obtained by fraudulent means.[10]

Construction Work.—An interesting case recently came up which is likely to occur in any kind of construction work with regard to the disposal of waste materials. The case decided was one in which the materials dredged were to be deposited *in-shore* so as not to interfere with the work. The contract simply consisted of an offer and acceptance, and it was held that it was *not* the duty of the contractee to furnish such shore as a place of disposal for dredged material, and that the contractor was not justified in abandoning the contract because the shore inspector prevented him from depositing such material thereon.[11]

Similar cases frequently occur in contracts where the terms of the contract require that the contractor shall clear, grub, excavate and *remove* materials, such as trees, stumps, rocks or other stuff from the premises, the contract not stating where they shall be placed and the contractor having no suitable or approximate place to which he will be permitted to remove them.

The above case is interesting in deciding this question and tends to prove that the contractor must provide a place for his rubbish, no matter at what cost. Some other interesting cases were decided as to the completion of contracts, thus under an entire contract for labor and materials with no provisions for payment until the work is completed, a contractor can recover nothing for partial performance.[11]

A stipulation for the completion of work "as soon as possible" requires its completion *within a reasonable time* and within such time as is reasonably necessary under the circumstances.[12]

Where in a business a carload varies from 35,000 to 60,000 ft. board measure, in a contract to furnish lumber at the rate of 1½ carloads per month for six consecutive months the court decided that each car should contain not less than 35,000 ft. of lumber.[13]

In an action for the contract price for doing work it is no defense that the work was not properly done when it was performed as directed by the company or proprietor.[14] And the fact that the company agreed to remove the faults and make the work good, but failed to do so, and the fact that such an agreement was independent of the written contract will not defeat its recovery.[14] In a written agreement to furnish railroad ties, to be delivered at points where they were needed, a contemporaneous agreement on the part of the company to haul part of the ties cannot be proven, as it is varying a written contract by parol testimony.[15]

If under a contract for work and materials the work is done and materials furnished, but not in the manner stipulated, the contractor cannot recover the *contract* price agreed upon; but if the work and materials are of value and benefit to the owner he may recover for the work done and the materials furnished.[16]

RAILROADS IN THE COURTS.

Injunctions and Mandamus.—The encouragement that railroads have received from the courts for several years back in the protection of their rights and property has taught them to give up the old and barbarous practice of fighting their own battles *vi et armis* and to seek the protection of the courts. This has been brought about by the wiser and more conservative policy of the public and especially of municipal corporations. The only way for railroads to contend with the public was to resort to the same weapons and to seek the same protection. The results of these appeals to the courts for preventing strikes and boycotts are well known. We recently noted the application for an injunction against the city of Chicago to restrain it from interfering with the company's property or its passenger business, claiming the right, under its charter, to regulate such details of transportation and care of property.

A recent decision of the United States Circuit Court has granted the right to railroad companies to require that state railroad commissioners should fix just freight rates. The charging of such rates so as to injure the railroad company in its property rights is a deprivation of property without due process of law within the inhibition of the state and federal constitutions, and further that the court may inquire into the justness of the rates fixed by the Commission and appoint a special master to take testimony in relation thereto.[17]

Another case decided in Georgia holds that a law which makes it a misdemeanor to run a freight train on any railroad in the State on Sunday, is a regulation of internal police and not of commerce, and is not in conflict with the United States Constitution even as to freight trains passing through the State and loaded exclusively with through freight.[18] This case is in approval of a West Virginia case of the State vs. Railroad Company, 24 W. Va. Rep., 783, and in disapproval of a Virginia decision in N. & W. R. R. Co. vs. Com., 13 S. E. Rep., 340.

We know of no instances yet in which the railroads have appealed to the courts for protection against tramps and train robbers, but there is no good reason why a railroad company should not receive the protection of the State troops if necessary just the same as the large mills and other corporations of the State, and after due notice to the Executive or a petition to the Court for the protection of their property against certain anticipated depredations of thieves and robbers, why the State or county should not ultimately be responsible for the destruction of property and even of life, at any rate if they do not make more effort to suppress such crimes than they have in the past, the past having illustrated conclusively that the present protection afforded is inadequate.

Right of Way.—A recent decision in Texas holds that a railroad company which permits combustible materials to grow and remain on its right of way, where it is liable to be ignited by sparks from engines, is guilty of negligence as a matter of law and therefore responsible for the consequence of it.[19]

Another case decides that where a highway is laid out across a railroad, the company is entitled to compensation for the fair value of the land taken, subject to its use for railroad purposes.[20]

If a railroad company ceases to use its right of way and leases the land to a person who takes exclusive possession, the company thereby abondons its easement and the land reverts to the original owner free from the easement.[21]

No license fron a city will exempt a railroad company from liability to the owner of a lot for an obstruction placed across an alley in its rear.[22] But it is held that a road built in a street that leaves sufficient space between the roadbed and abutting lots for ordinary travel is not such an obstruction of access as to permit damages for de-appreciation in their value.[23]

Liability for Stolen Property.—In a very recent decision of the United States Court at Seattle, Wash., the judge instructed the jury that a railroad company was not liable to a passenger for the loss of more money than was necessary for traveling expenses, or than a prudent man would carry with him when he had other means of safely bestowing it. The passenger was a victim in the train robbery at Hot Springs in November, 1893. The Court also ruled that while a railroad company must care for the safety of its passengers, it cannot be called upon to insure them against loss, nor required to carry force enough to repel robbers.[24]

A recent decision of the Tennessee court against the Pullman Palace Car Company holds that the sleeping car company is liable for money stolen from a passenger by the porter of the car on which he is traveling.[25] This decision is contrary to an earlier one rendered by the United States courts, which held that the sleeping car company was not liable for money stolen by its servant, the porter.[26] The Pullman Palace Car Company is not a common carrier in the conduct of its business of running sleeping cars, and therefore occupies a different position from what the railroad does to the passenger.[27]

[1] O'Brien and Clark vs. N. Y. City, Nov. 28, 1893.
[2] Dorwin vs. Westbrook (Sup.), 24 N. Y. Sup., 955.
[3] New York vs. Hamm (Com. Pl., N. Y.), 24 N. Y. Sup., 730.
[4] Levey v. N. Y. C. & H. R. R. (Super., N. Y.), 24 N. Y. Sup., 124.
[5] N. Y. & N. H. A. Sprinkler Co. v. Andrews (Com. Pl., N. Y.), 23 N. Y. Sup., 998.
[6] Marcus Sayre Co. v. Beruz (N. J. Ch.), 26 Atl. Rep., 911.
[7] Van Keuren vs. Miller (S. p.), 24 N. Y. Sup., 580. Bd. of Ed. vs. First National Bank (Sup.), 24 N. Y. Sup., 392.
[8] Hartford F. I. Co. vs. Bonner Mer. Co., 56 Fed. Rep., 378.
[9] M., K. & T. R. R. Co. vs. Elliott, 50 Fed. Rep., 772
[10] Stockton Works vs. Glen Falls Ins. Co. (Cal.), 33 Pac. Rep., 633, 637, 638.
[11] Cronin vs. Tebo, 24 N. Y. Sup., 644.
[12] Florence Gas, etc., Co. vs. Hanby, 13 So. Rep., 343.
[13] Ind. Cab. Co. vs. Hermann, 34 N. E. Rep., 579.
[14] Hogg vs. Jackson & Sharp Co., 26 Atl. Rep., 889.
[15] Scott vs. N. & W. R. Co., 17 S. E. Rep., 882.
[16] School district vs. Lund, 33 Pac. Rep., 595.
[17] Clyde vs. Richmond & D. R. R. Co., 57 Fed. Rep., 436.
[18] Hennington vs. the State, 17 S. E. Rep. 1000.
[19] Gulf, etc., R. R. Co. vs. Rowland, 23 S. W. Rep., 421.
[20] B. & A. R. R. Co. vs. City of Cambridge, 34 N. E. Rep., 382.
[21] Roby vs. Yates, 23 N. Y. Sup., 1108.
[22] L., N. & S. R. R. Co. vs. Curtan, 33 Pac. Rep., 297.
[23] C., K. & W. R. Co. vs. Union Ind. Co., Pac. Rep., 378.
[24] Guimares v. Northern Pac. R. Co.
[25] Pullman P. C. Co. vs. Gavin, 23 S. W. Rep., 70.
[26] Barrett vs. Pullman P. C. Co., 51 Fed. Rep., 796.
[27] 52 Fed. Rep., 262.

The St. Lazare Station.

We have received from Mr. Demoulin, representative of the French Railroads at the World's Fair, copies of reprints from the *Revue Générale des Chemins de Fer*, of various dates, containing very complete descriptions and illustrations of the hydraulic apparatus in the St. Lazare Station of the Western Railroad at Paris, as well as a description of the enlargement of the station and the organization of the work done in it. We mention this matter especially because the reprints constitute an admirable monograph on the subject of the use of hydraulic power in stations, which is attracting considerable attention among a few engineers in the United States. Mr. Demoulin's address is 21 Rue Faraday, Paris, and probably copies can be had from him.

The total of arrivals and departures of passengers from this station was 35,535,000 in 1892. The greatest number in any one day of that year was 137,332 on Sunday, June 12. The greatest number in and out in 1893 was 176,520 on Sunday, June 11.

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EDITORIAL ANNOUNCEMENTS

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The Railroad Commissioners of New York are making a determined effort to secure the passage of a law which shall lead to some real progress in the vast problem of abolishing grade crossings of highways along the miles of railroad in the state, and it is to be hoped that they will succeed. Paragraphs in Governors' messages and general declarations concerning the magnitude of the evil do not amount to much unless the overshadowing financial question is taken into account; and as the Commissioners seem to appreciate this, their present move is the most hopeful sign that has lately appeared. They are going to make a careful list, with the necessary particulars, of all the crossings on the 7,888 miles of railroad in the state, and they have consulted the Massachusetts Commissioners in regard to the experience in that state under the law by which the state bears one-fourth of the expense of constructing the bridges and approaches and paying land damages where crossings are abolished. It would hardly seem necessary to go to the expense of making such an elaborate preliminary report as was made in Massachusetts. It will be remembered that a special commission of three engineers made estimates in considerable detail at every crossing in that state, except three, finding that a total expenditure of about $45,000,000 was required. That was valuable work, but its repetition throughout New York State would probably not materially help the solution of the problem. The general result in Massachusetts has thus far been good. Only the rich roads have yet taken advantage of the state's assistance, and the crossings thus far abolished have been mostly those where land damages were not very heavy and where, consequently, the railroad has not had to pay much, if any, on that account. (The entire cost is generally apportioned by a special commission appointed by the Superior Court for each case, as follows: 10 per cent. to the town, 25 per cent. to the state, and 65 per cent. to the railroad.) But the appropriation made by the state, $500,000 a year for ten years, has not yet been drawn upon very deeply; and the tougher problems will probably receive attention when the towns become fully awake to the advantage they gain by the special law. Happily, New York is in easy financial circumstances, and there would seem to be no reason why she should not follow her neighbor's example. There has been some little comment at Boston on the fact that that city, paying 40 per cent. of the State taxes, is forced to help remote country towns more than it likes to, but we have not heard of any serious grumbling; and the evil which it is desired to cure—the killing of wayfarers and pedestrians, danger to trains and passengers, and an untold amount of anxiety—is so universally felt that as long as questions of equity are no more definite than they have thus far shown themselves to be, it would seem that New York, or any other state not badly in debt, could not make a better use of a part of its money.

The Lackawanna's Defense of the Time-Interval.

The relative merits of the space-interval and the time-interval systems for preventing rear collisions have been the subject of a good deal of newspaper comment since the collision at the Hackensack River on Jan. 16, and no doubt with good effect on public opinion. One of the most plausible arguments presented by the Delaware, Lackawanna & Western, in defense of its persistent continuance of the time-interval, is that on the tracks of the Pennsylvania road, which lie parallel to those of the Lackawanna across the meadows between Jersey City and Newark, two disastrous collisions have occurred, though the block system is in use; and as this is a legitimate argument, as far as it goes, it may be well to examine it a little.

In the first place, it is to be remembered that no one regards the block system as perfect. The most that is claimed for it is that it is far safer than the other when the speed and frequency of trains are the same. Where trains are very fast and very frequent it is a necessity, even if it were no safer than the other system. Where trains are slow or infrequent it is needed for safety though not for convenience. The trouble always comes, as it did on the Lackawanna, where the conditions imposed by the slow-and-infrequent rule become irksome and some engineman or superintendent decides to break over them. We have no desire to excuse the brakeman for not going back more promptly in the Lackawanna case, but this statement holds good there, in spite of any fault on his part, for the mere fact that the two trains were scheduled only five minutes apart at Newark and three minutes apart at Hoboken throws the principal weight of blame upon the two men referred to, the engineman and the one who is responsible for making the time-table. A simple calculation shows that the interval named does not allow a reasonable time for a brakeman to go back, and therefore safety depends upon the engineman's good judgment in running slowly whenever his view is short.

But the conditions are probably more severe on the Pennsylvania. Its total train mileage over the tracks in question is probably larger. Whether larger or not, the character of the trains is more varied, there being many more fast and heavy through passenger trains. At all events the officers of the Pennsylvania recognize that their trains are so numerous that it would be unsafe to depend upon the brakeman or the costly and irregular protection afforded by fusees. At best the time-interval would involve intolerable delays in foggy weather, as the Lackawanna people practically admit, by asserting that the engineman of train No. 84 ought to have run more slowly, though there was another passenger train only six minutes behind him. If the Pennsylvania people intend to maintain the reputation of their trains for punctuality the block system is therefore a necessity, and the only question in the matter is whether they manage it in the best way possible.

The two collisions on the Pennsylvania were due to the blunders of signalmen, who took it for granted that the block section was clear, before the man at the outgoing end had signaled to that effect. In each case it was the mistake of one individual. Similar mistakes have occurred in England, where block working has been common for 30 years. American and English experts would diagnose these cases differently. Americans would say that electro-mechanical locks, such as the Sykes, ought to be used, thus making it necessary for two men to coincidently do something wrong in order to admit a train to a block already occupied; or that a track circuit, extending throughout the length of the block section, should be used as a check on the signalman. On the other hand, an Englishman, arguing from the long experience of the roads of his country and their small collision record notwithstanding occasional mistakes like those referred to, would say that with sufficient care, discipline and experience, the proper degree of safety could be attained without the additional cost and complication involved in the introduction of the electric locks.

This English position has much strength. We Americans are apt to forget the great value to English signalmen and enginemen of their long years of familiarity with fixed signals, and all the conditions attending their operation. The average length of service of each engineman, fireman or signalman is undoubtedly much longer in England than on any American road, and that is an important element in their proficiency and reliability.

Any road in this country or any other, aiming to perfect its methods in all directions, is bound to heed these lessons of experience, either the English or American, or both. The Pennsylvania has lately put in a large amount of track circuit signals, showing that it is not standing still. Perhaps it has not progressed as fast as it might have done in bringing its force of signalmen up to the standard of the English roads, with their 30 years' experience, and perhaps it has; at any rate that would be a poor excuse for the Lackawanna road to offer, for if any American roads have forces of employees who are old and well-tried, like the English, the Lackawanna is probably one of them; so that if, with its excellent methods in discipline, it had adopted a sensible system, it might, perhaps, have made the best record in the country.

When the public demands that the block system shall be used on a railroad, it is often compelled to abandon the argument for safety and base its plea chiefly on consideration of convenience. The railroad officers will show that in clear weather they can run pretty safely without it, and that even in fog they can run safely with only a little delay; and so the whole question hinges on the abolition of this little delay; and, the question being thus narrowed, the party who is on the defensive has the advantage. This line of argument is especially successful where the road is level and straight, as it is between Newark and the Bergen Hill. But it should be remembered that the time-interval system is unscientific at best. Even in clear weather, its success depends upon the good judgment of the enginemen in estimating the distance between themselves and trains in advance, and where there are curves the factors which they have to consider in regulating their speed are so variable that no one thinks of formulating them very definitely. These considerations cannot be left out of the problem except where trains are spaced 15 minutes or longer at stations, and every one knows that as soon as we do that other dangers present themselves. The block system justifies itself even in a theoretical argument, if one cares to follow it out; but if we give due weight to the lessons of experience the case is settled before we have gone half way. The only successful defense for the old methods is to show such a degree of poverty as to warrant the claim that safety had better be sacrificed to save money.

Some Possible Safety Legislation.

George Stephenson's famous remark that if a railroad train were to strike a cow "it would be bad for the cow," has become historic. But it did not express the whole truth. In Cuba recently a train ran into a cow on the track, and as a result one car was hurled 200 yds. and 16 persons were killed. In England such an accident would have been impossible, because the tracks are thoroughly protected from all intruders, whether four-footed or two-footed; but the innumerable grade crossings in this country would easily permit a mishap of this kind to occur.—*New York Tribune*, Jan. 18.

Some persons (certainly not the readers of the *Railroad Gazette*) may suppose that accidents occasioned by the presence of animals upon the track are infrequent in the United States, whereas this is unfortunately not true; and in most of the states of the Union there is no provision possible on the part of the railroads by which this class of accidents can be prevented. In the older states the laws generally require that the railroads shall be fenced; but they make no regulation which requires that animals shall not be permitted to run at large. On the contrary, the common law rule which prescribes that the owner of any animal must keep it secure against causing damage to others has been superseded by statute, an agrarian act, which is so warmly supported by the farming communities that it is found advisable by the railroads, in many parts of the country, to pay something for the loss which a farmer may suffer by the killing of his stray animal upon a railroad highway crossing, notwithstanding that the railroad train and its passengers were endangered.

The dangers to the engineers and firemen have been minimized by the use of cow-catchers and cattle guards, but the great danger to passengers from cattle alongside the track cannot be prevented by such means, for when an animal is passed by a swiftly-moving train, instead of running off the crossing it is more than likely to back (bump up) into the train and fall between the cars, under the wheels, with fearful consequences to the train and its contents. Some of the worst accidents which have occurred in this country have been caused in this way, and more are likely to happen because of the great speed at which trains are now being run in the states where animals are permitted to go at large.

Unfortunately, too, the crossings of the highways are very likely to present the most attractive places for the beasts to stand or to lie in the evening or at night, when they cannot be seen, for the railroad is most frequently raised a few feet above the surrounding country and the cattle quickly discover that there is a gentle breeze blowing across this elevated spot, and resort to it from the whole neighborhood.

It is not probable that it can be brought home to the rural legislator, who insists upon the best of fences and the most excellent cattle guards to secure his

animals against injury from the railroad at other points, that there is danger imminent to him and his family at these crossings every time they ride upon the railroad. Animals will be permitted to run at large for some time to come, if we await the time when legislation which requires any action against stray cattle shall issue spontaneously from the ordinary legislature; because a consideration for cheap pasturage will prevail over the desire for positive safety until the travelers in any community shall outnumber the owners of cattle; although a demand in the name of justice and of safety to the public might be heard with much effect, if judiciously made.

The railroads are, however, not free from blame in this matter. So far as appears, they have quietly submitted to the present barbarous condition of things without a protest. At this time, when the national and state legislatures are so much in earnest that the railroads shall adopt all the improvements which promise increased safety to the public at the expense of the railroads, would it not be proper and wise for them to suggest that the public ought to co-operate with the roads in the suppression of this danger from cattle? Probably the Railroad Commissioners in any state would join in recommending suitable legislation upon this subject. For the prairie states a regulation that cattle should not be allowed to stray unguarded within a certain distance, say two miles, of any railroad, would afford much protection to trains; yet we think that everywhere the law should provide that any owner shall see to it that his animal shall not be the cause of damage to others.

Rapid Transit in New York.

Messrs. R. T. Wilson & Co. recently submitted to the Rapid Transit Commission a proposition for building an underground railroad for New York City. They propose to build the line substantially on the route and plan adopted by the Commissioners, in October, 1891; but instead of having the four tracks on one level would place them in two tiers, in a double-deck tunnel, or in two tunnels. They would build the line from the City Hall to Fourteenth street within two years of the date of signing the contracts; between Fourteenth street and Fifty-ninth on the west side and Fourteenth street and Forty-second on the east side within three years; between Fifty-ninth street and Fort George on the west side and Forty-second and Harlem on the east side within four years. The portion south of the City Hall they would also build within three years. When the system, so far as mentioned above, pays 4 per cent. on its cost outside of "operating and other expenses" they will build an additional mile on each side of the city, and as soon as each additional mile pays a net 4 per cent. they will build another mile, and so on until the termini provided by the Commission are reached.

They propose to go far enough below the surface to avoid all existing pipes, and to operate the road by electricity or some other motor that does not require combustion in the tunnel, and to use motors capable of a sustained speed of not less than 40 miles an hour, exclusive of stops.

They have arrived at the conclusion that private capital cannot be got to build a new rapid transit system in New York City and therefore propose to furnish one-third of the entire cost of the system if the city will loan to them its bonds for the remaining two-thirds. As, under the Constitution of the State of New York, the city cannot do this, it is further proposed that an amendment to the Constitution be adopted at the coming constitutional convention; then the people of the city of New York can vote whether or not they will grant this credit. They propose further that the loan shall be made on proper certificates on completion of each mile, as the work proceeds, and that the maximum loan of the city shall not exceed $30,000,000. If the entire cost runs above $45,000,000, Messrs. Wilson & Co. will furnish the rest of the necessary funds themselves. Moreover, they suggest that the amount of the loan should not exceed $2,500,000 a mile below Forty-second, or $2,000,000 a mile above that.

It is assumed in this scheme that the road, its stock and its bonds should be free from taxation until entirely completed, and that any junior mortgage bonds should be free from taxation, the municipality to tax eventually the stock only. They propose also that the company to build and work this system should be incorporated under the general railroad law and not under the present rapid-transit act.

This all sounds like a very reasonable proposition, and there are many reasons why it should be hoped that such an amendment can be got through the constitutional convention. It has long been apparent that private capital cannot be secured for this purpose. For the last three years or more we have been pretty well convinced of this. The risks of adequate interest on the investment are too great; and it is certain that interest cannot be paid for a good while to come. On the other hand, there can be no question of the great need of more means of quickly transporting the people from one part of the island to the other than now exists; nor can there be any doubt of the immense gain to the city from improved transportation facilities. If, therefore, the city needs more rapid transit, and if private capital cannot be found to buy a franchise and build and operate a road, the city must help in some way. We still think, as we have long thought, that very liberal concession should be made to the Manhattan company to induce that company to spend a good deal of money in adding to its present facilities, and that this should be done under such terms and with such promptness that almost immediate relief can be got. Meantime, something like the Wilson plan could be gradually carried out, developing an independent system.

There is another aspect to all this. It naturally occurs to one that the aid of the city might as well be extended to an overhead railroad as to an underground system, and certainly an overhead system, properly devised and properly located, has immense advantages over an underground. Why, therefore, does not somebody get up a plan, as reasonable as that of the Wilson company, for a new elevated system?

Hungarian Zone Tariff—Further Results.

The Hungarian State Railroads have recently published the accounts of their passenger traffic for 1892, which enables us to see its progress under the zone tariff, which, it should be remembered, went into effect Aug. 1, 1889.

The number of passenger journeys has been:

1888.	1889.	1890.	1891.	1892.
9,056,500	13,054,500	21,635,600	25,781,400	28,623,700

The amount and percentage of increase each year over the previous year have been:

	1889.	1890.	1891.	1892.
No. passengers	3,998,000	8,581,100	4,145,800	2,842,300
Per cent	44	65½	19	11

The reduced rates were in effect only five months in 1889, in spite of which travel increased 44 per cent., and this explains the much larger increase in 1890. The mileage of the state system increased 11 per cent. from 1888 to 1892. The Hungarian lines of the Austro-Hungarian State Railroad Company, among the most important in the country, became the property of the state meanwhile, and the zone tariff was first applied to them in 1891. The rate of increase naturally could not be expected to keep up to the high percentages of 1889 and 1890, but for a country like Hungary it was large even in 1892. The whole number of passenger journeys was *three times* as great in 1892 as in 1888. The fares previous to the zone tariff were among the highest in Europe, and the passenger traffic extremely light, averaging scarcely one journey per inhabitant per year, against two in Austria, five in Germany, 15 in England and eight in the United States. It is true that the "passenger journey" is a very unsatisfactory unit, especially in comparing one country with another; but under the zone tariff the sales of tickets do not show the mileage, though except in the last zone, where the journeys at one fare vary in length from 140 to 578 miles, the mileage can be calculated approximately.

The passenger earnings of the Hungarian State Railroads for the same five years have been, calling the florin 48 cents:

1888.	1889.	1890.	1891.	1892.
$6,773,760	$7,210,320	$8,129,760	$8,924,064	$9,448,752

The amount and percentage of the increase each year over the previous year have been:

	1889.	1890.	1891.	1892.
Amount	$436,560	$919,440	$794,304	$524,688
Per cent	6.4	12.8	9.8	5.9

The increases in earnings are comparatively small, but they are continuous, and if they equal the increase in expenditures on account of passenger traffic, they more than justify the innovation, which, without doubt, has been of very great advantage to the nation. Unfortunately we have nothing to show what the course of expenses has been. The number of passengers cannot have tripled without a considerable increase in expenses, but the proportion of this, of course, would be very much less than that of the increase in travel.

As we have shown before, by far the larger part of the increase in travel has been in the short journeys. The Hungarian reform had a feature entirely distinct from the zone tariff. This is the "neighborhood rate." From any station to the next station, without regard to distance, the tickets cost 14.4, 7.2 and 4.8 cents for the three classes respectively, and for the second station, 19.2, 10.6 and 7.2 cents. These tickets are not good on express trains, but substantially all the short distance travel is done on them, and this is a travel which in many parts of Hungary scarcely existed before the new tariff. The zone rates we recall to the reader's mind are 50, 40 and 25 kreutzers for the first zone, 25 kilometers or less, for ordinary trains, and 60, 50 and 30 for express trains; an additional equal amount for each additional zone up to and including the 11th, these zones, however, increasing by 15 kilometers each; for the 12th zone, measuring 25 kilometers, the additions are the same; for the 13th, also 25 kilometers, the rates increase 100, 50 and 50 kreutzers by ordinary and 120, 60 and 60 for express trains; this brings us to 225 kilometers; all stations at a greater distance than 225 kilometers are included in the 14th zone, tickets for which cost 8, 5.80 and 4 florins by ordinary trains, and 9.60, 7.00 and 4.80 by express trains. This is the tariff as it was first introduced. No third-class passengers have been carried on express trains since 1889.

To make the rates more readily intelligible to the American reader we will translate them, for the first class only, into our currency and distances. For a distance of 15½ miles or less you pay 24 cents; for every additional distance of 9.3 miles, up to 109 miles, 24 cents more, making $2.64 for 109 miles; for the next 15½ miles (making 124½ miles), 24 cents more, or $2.88; for the next 15½ miles (making 140 miles), 48 cents more, making $3.36; for any greater distance $3.84. For second class tickets the charge is, as near as may be, one-fifth less; for third class, just one-half; by express trains, one-fifth more.

The following shows the number of passengers in the first, the fourteenth and the aggregate of the 12 intermediate zones in 1888 and 1892, the trips at "neighborhood" rates being nearly all in the first zone:

	1892.	1888.	Increase.	Per cent.
Zone 1	20,412,100	2,512,400	17,499,700	601
Zones 2 to 13	7,741,000	5,897,900	1,343,100	23
Zone 14	970,600	246,200	724,400	294
Total	28,623,700	9,056 500	19,567,200	216

We here see how great a part of the new travel is short travel. The number of journeys of less than 16 miles is seven times as great as in 1888. In the next 12 zones, 16 to 140 miles, the growth is not more than might be expected without change in rates; and here, be it remembered, the change in rates was least. In the fourteenth zone, all distances over 140 miles, the journeys are four times as numerous as in 1888. When we remember that one can go from any station in Hungary to Budapest for less than $2, and also to Fiume, on the Adriatic, for that sum, and that there are some 16,000,000 of people in Hungary, the only wonder is that there has not been a greater increase in the long journeys, if we can call "long" a trip as far as from New York to Albany.

The earnings from the above traffic have been:

	1892.	1888.	Increase.	Per cent.
Zone 1	$1,502,976	$500,688	$1,002,288	200.2
Zones 2 to 13	5,478,048	5,399,328	78,720	1.5
Zone 14	2,467,728	873,744	1,593,984	182.4
Total	$9,448,752	$6,773,760	$2,674,992	39.6

While the number of passengers traveling less than 16 miles is seven times as great as in 1888, the earnings from them are but three times as great; there has been but an insignificant increase in earnings from journeys between 16 and 140 miles; while from journeys longer than 140 miles, receipts have nearly trebled, and nearly three-fifths of the total increase in passenger earnings is from this fourteenth zone, the average fare of the passengers in it being $2.54 now, against $3.55 in 1888; while the average of the first zone passenger is but 7.35 cents, against 30 cents.

Only 4.4 per cent. of the passengers traveled by express trains (paying 20 per cent. more fare) in 1892, but these 4.4 per cent. of the passengers paid 21.7 per cent. of the passenger earnings, as they are all first and second class passengers and travel the longer distances.

After all this wonderful growth, the Hungarians still travel less than any of the other leading civilized peoples, the average number of journeys per inhabitant having been 1¾ in 1892. The passenger earnings per inhabitant that year were less than 60 cents, against $4.10 in the United States.

December Accidents.

Our record of train accidents in December, given in this number, includes 84 collisions, 77 derailments and 5 other accidents, a total of 166 accidents, in which 31 persons were killed and 209 injured. The detailed list, printed on another page, contains accounts only of the more important of these accidents. All which caused no deaths or injuries to persons are omitted except where the circumstances of the accident as reported make it of special interest.

These accidents are classified as follows:

COLLISIONS:	Rear.	But-ting.	Crossing and other.	Tot'l.
Trains breaking in two	13	0	1	14
Misplaced switch	2	1	2	5
Failure to give or observe signal.	6	0	7	13
Mistake in giving or understanding orders	0	5	1	6
Miscellaneous	14	4	10	28
Unexplained	5	5	8	18
Total	40	15	29	84

DERAILMENTS:			
Broken rail	7	Bad loading	1
Loose or spread rail	1	Animals on track	1
Defective bridge	3	Landslide	4
Defective switch	3	Snow	1
Defective frog	1	Washout	1
Defective joint	1	Sand drifted	1
Broken wheel	1	Malicious obstruction	3
Broken axle	10	Accidental obstruction	2
Broken truck	2	Unexplained	28
Failure of drawbar	2		77
Careless running	4		

OTHER ACCIDENTS:	
Boiler explosion	2
Cylinder explosion	1
Other causes	2
	5
Total number of accidents	166

A general classification shows:

	Collisions.	Derailments.	Other acc'd'ts.	Total.	P.c.
Defects of road	0	16	0	16	9
Defects of equipment	14	15	3	32	18
Negligence in operating	52	5	0	57	36
Unforeseen obstructions	6	13	2	15	8
Unexplained	18	28	0	46	29
Total	84	77	5	166	105

The number of trains involved is as follows:

	Collisions.	Derailments.	Other acc'd'ts.	Total.
Passenger	41	22	1	64
Freight and other	113	55	4	173
Total	154	78	5	237

The casualties may be divided as follows:

KILLED:	Collisions.	Derailments.	Other accidents.	Total.
Employees	11	9	4	24
Passengers	2	3	0	5
Others	1	1	0	2
Total	14	13	4	31
INJURED:				
Employees	52	35	2	89
Passengers	49	67	0	116
Others	2	2	0	4
Total	103	104	2	209

The casualties to passengers and employees, when divided according to classes of causes, appear as follows:

	Pass. killed.	Pass. injured.	Emp. killed.	Emp. injured.
Defects of road	3	44	2	4
Defects of equipment	0	0	3	5
Negligence in operating	2	49	13	54
Unforeseen obstructions and maliciousness	0	18	2	16
Unexplained	0	5	4	10
Total	5	116	24	89

Seventeen accidents caused the death of one or more persons each, and 47 caused injury but not death, leaving 102 (61 per cent. of the whole) which caused no personal injury deemed worthy of record.

The comparison with December of the previous five years shows:

	1893.	1892.	1891.	1890.	1889.	1888.
Collisions	84	107	125	82	90	61
Derailments	77	95	101	111	67	61
Other accidents	5	10	8	14	11	14
Total "	166	212	234	207	168	136
Employees killed	24	37	62	35	44	41
Others "	7	4	23	18	8	5
Employees injured	89	110	172	104	122	73
Others "	120	119	159	79	52	63
Passenger trains involved	64	84	72	80	59	56
Average per day:						
Accidents	5.36	6.84	7.55	6.68	5.42	4.39
Killed	1.00	1.32	2.74	1.71	1.68	1.48
Injured	6.74	7.39	10.68	5.90	5.61	4.39
Average per accident:						
Killed	0.187	0.193	0.363	0.256	0.309	0.338
Injured	1.259	1.080	1.415	0.884	1.036	1.000

It will be noticed that the total number of accidents in this list is smaller than before in the same month for five years, and that the number of employees killed is much smaller than in any December shown in our comparisons. The total number killed—employees, passengers and others—has not been so small in *any* month since April, 1890, when we recorded only 15 under this head; and it has not been so small in any winter month since February, 1889. The average number of employees killed in train accidents each month since the beginning of 1890—four years—has been 42⅛. A single month is too short a time from which to draw conclusions of much value, but it is doubtless true that the great falling off in business throughout the country, reducing the number of trains run, and often also the amount of work to be done by the men who do run, has been a chief factor in producing this exceptional December record. Many men have been discharged and, of course, every superintendent discharged the poorer ones where he could, thus raising the average efficiency of his force. Reductions in passenger service contributed to the general safety by throwing many experienced men back into the freight-train service. The strain on the men has been moderated both by the smaller amount of work to do on the road and, in the case of men running first-in-first-out, by the longer intervals between trips. To these factors there would be added, by some superintendents, the smaller quantities of beer drunk by some men, in consequence of their reduced income.

The worst accident in December was that near Dunkirk, N. Y., on the 15th, where two trainmen and three passengers were killed. The whole train fell into the creek, except that one end of the hind car remained hanging to the bridge floor; and the fact that there were very few passengers aboard explains the small number of fatalities. There was considerable evidence that the flood in the creek was higher than had ever before been known and that a dam some distance up stream had defective flashboards, allowing the volume of water to be abnormally increased in a short time when the pond filled up. On the same day there was a bad derailment at Bamford, Pa. In this case also the two passenger cars fell so as to be nearly submerged in the water. The collision at Bessemer, Pa., on the 19th, also was similar to these in one respect, the passenger car falling off a bridge and down to the bank of a creek. In this case the car took fire. The record of passengers injured is swelled by the derailment at Lordsburg, N. M., on the 9th, which is supposed to have been caused by the malicious work of tramps, of which there are now a large number in that region. The other most serious passenger train accident was the collision near Nanticoke, Pa., on the 13th.

A passenger train struck an electric street car at Binghamton, N. Y., on the 1st. A similar collision damaged a "dummy" train at Birmingham, Ala., on the 2d, and in Utica, N. Y., on the 11th, a street railroad snowplow was run into by a freight train on a crossing. On the night of the 21st three persons in a sleigh were killed by a train near Hollis, N. H., and on the 30th three were killed at one stroke at Patuxent, Md. Near Greensburg, Pa., on the 22d, three tramps were killed by a train at once.

Electric street cars collided with each other at Jersey City, N. J., on the 2d, and again on the 26th, and at Shenandoah, Pa., on the 25th. In Chicago, on the 5th, six persons were injured in a cable car collision and several were injured by jumping from a runaway electric car at Wilkes-Barre, Pa., on the 22d. The motor man lost control, and "the reverse current would not work." The car did not leave the track, however, and those who remained upon it suffered no bodily injury.

President Cleveland has vetoed the bill authorizing the construction of the New York & New Jersey Bridge. The objections raised in the veto message are: First, the bill does not mention a single span, nor is there anything to indicate that it was within the intention of Congress that a bridge should be built without piers. Therefore, the President doubts if the Secretary of War would have the right, under this bill, to exact the building of a bridge without piers in the rivers. Second, it is questionable whether any piers should be permitted in the North River at the point designated for the location of this bridge and in this connection he cites the opinion already expressed by Mr. Clarke, the Chief Engineer of the company, that a suspension bridge could be built spanning the entire width of the river. Third, the New York State charter of this company expressly forbids putting any piers in the river, and the President thinks that due regard should be had to the judgment of the Legislature of the State of New York in granting that charter. Fourth, the President objects to the stipulation that the United States shall pay toll for the carriage of mails across the bridge. This expense to the government should, he thinks, be limited to the compensation paid to the railroads for transportation. Fifth, the most important point, and the one on which the President puts most stress, is the fact that the bill authorizes an unnamed company (but means the North River Bridge Co.) to put a pier in the river at the latitude of Twenty-third street. The congressional charter of this latter company requires a clear span at that location, but the new bill releases the company from that obligation. Therefore, the new bill becomes equivalent to a new grant to the North River Bridge Company, differing very materially from the one that it was thought expedient to make at the time its congressional charter was given, and removes the guaranty that no obstruction shall be placed in the river by that company. In effect, a new charter is granted to a company not named in the bill and without any apparent reason for the important enlargement of its privileges thus accomplished. It is quite apparent that the reasons which obtain against putting a pier in the river at the site of the New York & New Jersey Bridge are immensely greater as against a bridge at the lower site. Whatever question there may be about the injurious character of such obstruction at Sixty-sixth street, there can be no doubt that piers in the river at Twenty-third street would be very serious impediments. Therefore, the President thinks that in a matter so important, each scheme should be considered by itself and on its own merits. We think that it was anticipated from the moment that the bill was passed that the President would veto it for this last reason, and certainly his position is a very strong one. We do not regard it as an unmitigated misfortune that the New York & New Jersey Company should have had its congressional charter postponed for a while, because certainly nobody can finance either one of those schemes for many months to come.

Judge Hallett, of the United States Circuit Court at Denver, has rendered a decision depriving the Receiver of the Union Pacific, Denver & Gulf Railroad of the services of his attorneys and counsellors at law. In it the judge instructs the Receiver of the road not to employ or consult with a certain firm of attorneys, because of their professional connection with a plaintiff to a suit, on account of the apparent conflict of interest. The plaintiff, Evans, is ex President of the road, a heavy stockholder, and has petitioned the Court to protect the interests of the road, so that he may, perhaps, be said to represent the railroad company's interests. A Receiver being an officer of the Court is, of course, subject to the Court's instruction; and other Courts may properly follow the precedent established and advise that the same attorneys should not act for the road and its Receiver at the same time, insomuch that the interests of the former management of the road might conflict with the policy of the Receiver. If the Courts should take such a stand the attorneys of a number of railroad companies would be deprived of rich clientage. It is reported that the attorneys of the Union Pacific, the Atchison, the Northern Pacific, the Erie and other roads which have gone into the hands of a Receiver, now represent both the company and the Receivers, and it might be very annoying if some of the large stockholders should petition the Courts to have the Receivers dispense with the services of these attorneys who have conducted and attended to the business of the road for many years. Certainly there is some ground upon which a case might be based where the same attorneys are retained to represent a corporation which has been led into bankruptcy by their advice and counsel. To retain the confidence of foreign as well as domestic investors the directors of railroads should encourage the Courts to pursue the most scrupulous policy possible in the management of property committed to their care, and if they do not, then it is time for the stockholders to be heard. It does not require very high sensibilities or large business experience to appreciate that the appointment of the same officials to a receivership as have had the conduct of the road prior to its trouble is at least a proper subject for explanation—and this may apply to the attorney as well as the President. The contest now on in the New York & New England's Receivership is a good illustration of the difficulties which the Courts have to meet.

No bids were received by the assignees of the Grant Locomotive works in response to their offer to receive, up to Jan. 15, proposals for the entire property of the company. This was to have been expected, as it is understood that the offer was made in order to give any dissatisfied stockholders an opportunity to purchase the property. Apparently the stockholders are either satisfied or else short of cash or confidence in the future. It is probable that when the present financial condition has improved the Grant Locomotive works will seek orders and begin again the building and repairing of locomotives, and its officers expect a heavy demand for new locomotives and for repair work. Of locomotives, as of other equipment and goods in general, it is true that the supply is being entirely used up before orders are given for renewals. One road, which is in the hands of receivers, has fifty per cent. of its locomotives in the "hospital," and nothing is being done for them but to rob them to piece out other locomotives. Another road, also being operated by receivers, has twenty-five per cent. of its locomotives on the disabled list. These roads are being operated by receivers, but similar conditions exist on roads operated by their owners, and it is safe to say that if there has been at any time a surplus of locomotives in good condition, that surplus now appears in the form of locomotives disabled by accidents and general wear and tear, the latter aided much by neglect of repair work; and that when repair work and building begin there will be a heavy demand for both.

NEW PUBLICATIONS.

Journal of New England Water-Works Association, December, 1893. W. H. Richards, New London, Coun. This journal is published quarterly at 75 cents a number, and the number before us contains the report of the fall meeting, with papers and discussions. Among the papers is one by Mr. John Thomson on the "Use of Water Meters," one on "Stand Pipes," by Mr. J. C. Chase; one on "Details of Pipe Castings and Coatings," by Mr. Dexter Brackett, and one on "Recent Practice in Pumping," by Mr. F. W. Dean.

California; Eleventh Annual Report of the State Mineralogists for the two years ending Sept. 15, 1892. This report is received from Mr. J. J. Crawford, State Mineralogist, Sacramento, Cal. It has no table of contents, but a very full alphabetical index, and is accompanied by geological maps of a few limited regions. The report is a series of monographs on the geology and mineralogy of various counties written, by members of the staff.

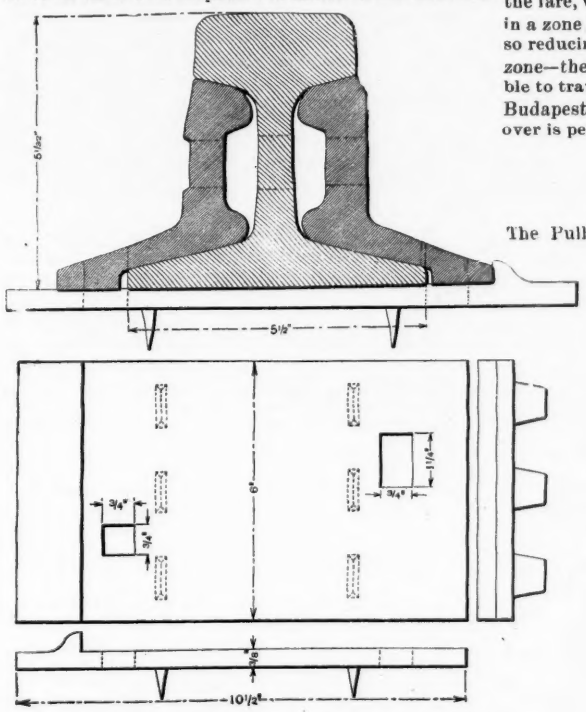
TRADE CATALOGUES.

The C. W. Hunt Company, 45 Broadway, New York, has recently issued a brief and comprehensive list of the various lines of machinery which it manufactures, including coal and ore handling machinery, elevators, conveyors, cable railroads and various forms of power transmission. Special attention is given to the Hunt system of industrial railroads and to locomotives and cars for different purposes. Though nicely got up, it does not pretend to be complete, and for detailed information the special catalogues issued by the company must be consulted.

The Ashton Valve Company, Boston, New York and Chicago.—A neat catalogue has lately been issued by this company illustrating and setting forth the merits of its pressure vacuum gages, test pumps, clocks and revolution counters. This company handles both the Edson and the Peerless pressure recording gages, pop valves and various other attachments and boiler fittings.

Tie-Plates on the Boston & Albany.

The Boston & Albany Railroad has recently ordered an aggregate of 501,000 C. A. C. tie-plates for use under its 95-lb. rails. This tie-plate was shown in the *Railroad*



The C. A. C. Tie-Plate on the Boston & Albany.

Gazette in 1892, page 507, and the rail was very fully illustrated, described and discussed by us as long ago as 1891. Therefore it is not necessary to add anything to what we have said before on this subject. The engravings show the tie-plate in plan and elevations and also as applied at a joint, and the dimensions are sufficiently given there.

Foreign Railroad Notes.

The Swiss railroads propose to introduce "standard time" next June; but some legislation is necessary first. There is said to be little opposition to it except in the French cantons. The time is that of the 15th meridian east of Greenwich, called "Central European time," already adopted in Germany, Austria and Italy. The easternmost part of Switzerland is about 10 deg. east of Greenwich, and the westernmost about 6; the rail connections with Germany, Austria and Italy are important, more so probably than those with France, which seems likely to adhere to Paris time yet a long while, and perhaps has less occasion to be affected by its foreign railroad connections than any other great continental country except Russia.

It has been reported, to the general astonishment of the Russians, that the government has determined to acquire the railroads owned by the Great Russian Railway Company, including that from St. Petersburg to Moscow, and farther east to Nishni Novgorod, and that from Moscow to Warsaw. These are, perhaps, the most important lines in Russia, and the company has been very prosperous, has had its stock held in influential quarters, and is said to have exercised very great power in the State, which causes the astonishment at its fate. The system has 1,514 miles of road and its capital stands at about $356,000,000, or $235,000 per mile of road. The line from St. Petersburg to Moscow, which Ross Winans built, stands at a great deal more than this. Yet the lines are all in a comparatively level country, and had not extraordinary expenses for right of way on land in large cities. The government will have to pay for the stock a valuation based on the income of the best five of the last seven years. Only a small part of the capital is in shares—75,000,000 metal rubles, or $56,250,000. But it is safe to say that the whole capital, rationally used, could have provided four times as much railroad as the company owns.

The Hungarian authorities have recently published a statement showing the travel on the state railroads in 1892, from which it appears that it was 218 per cent. greater than in 1888, which was the year before the introduction of the zone tariff, the mileage of the system being increased 11 per cent. meanwhile. The passenger earnings have increased 40 per cent. There is nothing to show the change in passenger expenses. Per mile of road the increase in travel has been 192 per cent., and in passenger earnings 29 per cent. From 1891 to 1892 there was an increase of 9 per cent. in travel and of 4 per cent. in earnings, showing that the growth is chiefly in the shorter journeys. Since 1888 the increase in travel per mile has been 34 per cent. on the Prussian and Austrian state railroads, and 39 per cent. on a leading Austrian private railroad, while there has been a decrease of 11 per cent. on the Warsaw & Vienna line, and of 20 per cent. on the Dutch railroads. Travel, however, is still lighter on the Hungarian railroads than on those of Austria and Germany.

Slight changes have been made in the Hungarian passenger tariff, chiefly by changing the zone of certain stopping places, not regular stations, which have been put in the zone of the next regular station, so raising the fare, while some regular stations have been included in a zone below that which their distance would require, so reducing the fare. Moreover, tickets for the 14th zone—the largest, including the longest distance possible to travel on the system without passing through Budapest—have been limited to 24 hours, and no stopover is permitted.

TECHNICAL.

Manufacturing and Business.

The Pullman Palace Car Co. has delared a quarterly dividend of two dollars per share, payable Feb. 15.

Work was resumed on Jan. 24 in eight furnaces or about one-half the departments of the National Tube Works, McKeesport, Pa., and also in the National Rolling Mill, at McKeesport.

The following are the incorporators of the West Virginia Bridge Co., of Point Pleasant, W. Va., the incorporation of which was noted in our issue of last week: J. W. E. Heslop, David Piece, A. L. Boggess, G. Poffenbager and W. N. Howard, all of Point Pleasant.

The Berry & Orton Co., of Philadelphia, has resumed business, having made a settlement of its financial difficulties on terms satisfactory to all interested. As previously stated, the firm's difficulties were brought on by a disaffected stockholder with whom the firm has since made a satisfactory settlement. All the creditors willingly granted the extension of time which was asked.

The Fernandina Oil & Creosote Works has been organized this month with B. T. Burchardi as manager. This company succeeds the Creosote Lumber & Construction Co., of Fernandina, whose plant it has purchased. The property of the old company was sold under foreclosure in 1892, and purchased by the First National Bank of Fernandina, and then resold to the new company, in which many of the creditors of the old company are interested.

The Grand Trunk has asked bids for its coal supply, bids to be opened at Montreal, Feb. 7. The figures quoted on this supply are usually used as a basis for several other large contracts, and there is therefore considerable interest in the bidding. The total amount required for the coming year is 743,600 net tons as follows: Portland, 39,200; Montreal, 89,600; Brockville, 40,000; Chaudiere Junction, 44,800; Detroit, 70,000, and Buffalo and Suspension Bridge, 460,000 The last named amount is 100,000 tons more than last year.

The Westinghouse Electric & Manufacturing Company makes a general announcement that it will at its own cost and expense defend all suits against purchasers of its machinery and apparatus. It boldly asserts its position in the market as that of a competitor of the General Electric Company, and offers its apparatus and repairs at fair prices, which are reasonably near the cost of production. The circular sets forth some of the advantages of the company's lamps and system of lighting, and solicits correspondence from those who use electrical devices and are persecuted by patent litigation.

Iron and Steel.

The Columbia Iron & Steel plant at Uniontown, Pa., will be sold on Feb. 10 to satisfy a mortgage for $350,000.

The steel works of the Colorado Fuel & Iron Co. at Pueblo, Col., have resumed operations in the cold steel department with a force of 700 men.

The Ohio Steel Company has awarded contracts for three large engines to be erected by William Tod & Co., and has placed a large contract for tables with the Lloyd-Booth Co. The pit furnace building for the blooming mill and three finishing mills will be erected by the Youngstown Bridge Co.

On April 4 next the twenty-year charter of the Thomas Iron Co., Hokendauqua, Pa., will expire by limitation, and a movement is now on foot to have it renewed. The company now has four of its eleven furnaces in operation. A semi-annual dividend of three per cent. has been declared, payable Feb. 1.

The Joliet Mills of the Illinois Steel Co. resumed work on Jan. 22, and it is said that they will now run steadily. These mills were idle nearly all of the year 1892; they resumed work on Nov. 20, employing about 900 men, but closed again on Dec. 30. It was announced then that the works would be closed indefinitely, and the order for restarting them at the present time comes somewhat unexpectedly.

The annual meeting of the stockholders of the Cambria Iron Co. was held in Philadelphia on Jan. 16, and the following were elected directors: Josiah M. Bacon, A. J. Drexel, Jr., Robert F. Kennedy, James McMillen, David Reeves, Powell Stackhouse, John W. Townsend, John Lowber Welsh and R. Francis Wood. Subsequently a special meeting was held and an increase of the capital stock from $5,000,000 to $10,000,000 was agreed to by the stockholders, and also a proposed increase of the funded indebtedness by an issue of bonds to the amount of $2,500,000. The Board of Directors was authorized to make the proposed increase at its discretion, should occasion require it. While authority has thus been granted to obtain new capital if required, it is understood that it is not the intention of the management to make use of the authorized issue at any time in the near future.

New Stations and Shops.

The shops of the Baltimore & Ohio at Connellsville, Pa., are to be enlarged this year and new buildings are to be erected to replace some of the present structures.

Foreign Technical Notes.

Steam boiler and engine statistics, gathered in the German Empire, show that at the beginning of 1893 there were in operation 81,000 stationary boilers and 78,936 stationary engines.

Statistics gathered by the General Electric Company, of Berlin, Germany, show that electric street railroads are now in operation at Halle, Gera, Breslau and Essen, while at Chemnitz, Dortmund, Lübeck and Pauen such lines are now being built. All of these have the overhead system of transmission.

According to the *Zeitschirft* of the Austrian Engineers' and Architects' Society, the danger from lightning in Germany has increased threefold since 1838, and the annual loss from lightning damage is placed at about $2,000,000. Forest denudation, the large quantities of smoke produced in the industrial districts, and the great increase in the number of iron structures all over the country are offered as likely explanations for this phenomenon. Danger from lightning, it is maintained, is more apt to be encountered in the country districts than in cities, in which latter a greater or less number of tall structures, like chimney stacks and church spires equipped with lightning rods, and a general use of exposed metal work have a tendency to harmlessly disperse atmospheric electricity.

The Improvement of Duluth and Superior Harbors.

In his annual report on the improvements of our rivers and harbors on Lake Superior, Maj. Clinton B. Sears, U. S. A., says that as Congress has commenced the construction of a 20-ft. channel between Buffalo and Duluth the channels in Superior and St. Louis bays, which constitute an extension of this route, should properly be improved to a depth of 20 or 22 ft. so as to have them ready at the competition of a 20-ft. channel through the lakes, as the great bulk of the commerce passing through the St. Mary's Falls Canal comes to Duluth and Superior. Unless the new deep draft vessels can reach the docks on Superior and St. Louis bays, the deepening of the St. Mary's River will be of but little use.

The ruling depths in the portions of the harbor dredged by the United States are:

	Feet.
In canal	17
In the inner basin or harbor	16
In channel on north shore of St. Louis Bay for a distance of about 12,900 ft.	16
In new channel east of Rice Point	16

The Production of Pig Iron and Bessemer Steel.

Mr. Swank has compiled the returns of manufacturers and finds that the production of pig iron in the United States for 1893 was 7,124,502 gross tons as against 9,157,000 tons in 1892. The stocks of pig iron unsold in the hands of manufacturers and their agents on Dec. 31, 1893, and not intended for their own consumption, aggregated 662,068 gross tons, against 506,116 tons at the close of 1892, and 549,141 tons on June 30 last.

The production of pig iron by half-years has been as below, in gross tons:

Year.	First half.	Second half.	Total.
1889	3,661,693	3,942,039	7,603,642
1890	4,560,513	4,612,190	9,202,703
1891	3,368,117	4,911 763	8,279,870
1892	4,769,682	4,387,317	9,157,000
1893	4,562,918	2,561,584	7,124,502

It will be noticed that the production for 1893 was 2,032,498 tons less than in 1892, and that about all of this reduction was in the last half of the year. In other words our production and consumption for 1892 and the first half of last year were, in round numbers, 310 lbs. per capita, and for the last half of the year they were about 170 lbs. per capita.

The total number of Bessemer steel ingots last year was 3,123,524 gross tons, as against 4,168,435 tons in 1892. The production of Bessemer steel rails was 1,036,353 tons, against 1,458,732 gross tons in 1892. The product for 1893 was the smallest since 1885.

The production of Bessemer steel ingots by half-years has been:

Year.	First half.	Second half.	Total.
1892	2,058,928	2,109,507	4,168,435
1893	2,092,057	1,031,467	3,123,524

The production of Bessemer steel rails has been:

Year.	First half.	Second half.	Total.
1892	772,436	686,307	1,458,743
1893	704,240	332,113	1,033,653

Trial of Cruiser "Montgomery."

The cruiser "Montgomery" had a successful trial trip in Long Island Sound on January 19, and demonstrated her qualities for speed. The average speed recorded was 18.85 knots, which, when corrected for tidal influence, was increased to 19.056 knots an hour, giving the contractors a premium of $200,000. The engines

worked smoothly and without accident or injury, the average number of revolutions with the port and starboard engine being 180 and the average steam pressure 166 lbs. The "Montgomery" is a simple cruiser, depending upon her coal and the weather-tight deck $\frac{1}{16}$ of an inch thick for protection to her boilers, engines and magazines. The hull is built of mild steel and the rig is of a two-masted schooner spreading about 2,689 sq. ft. of canvas. Power is furnished by two triple expansion engines, and she carries a coal supply of 200 tons, which may be increased to 433 in an emergency. The main battery consists of eight 5-in. and two 6-in. rapid firing guns and three torpedo launching outfits, six six-pounder and two one-pounder rapid firing guns and two Gatling guns. The contract price is $612,500, and the Columbian Iron Works are the contractors. The total length of the ship is 257 ft.; extreme breadth, 37 ft.; mean draught, 14 ft. 6 in.; and displacement, 2,000 tons; contract indicated horse power, 5,400. She has a steaming capacity of 8,952 knots, or 37.6 days at a 10-knot speed, or 1,624 knots in 3.76 days at an 18-knot speed.

Steam Heating.

A notable feature of the meadows collision and telescoping on the Delaware, Lackawanna & Western road is the statement by one of the officers of the road that none of the steam-heating pipes or fittings were broken or split; no steam escaped from them, and the passengers imprisoned in the terrible wreck were not subjected to the additional misery of fire or escaping steam. The cars were all fitted with the Gold Storage system, an essential feature of which is that all interior pipes and fittings are capable of resisting 1,000 lbs. per inch pressure, while ordinary pipes and fittings are capable of only about 200 lbs.; and there have been several actual cases of steam-pipe bursting in cars at a pressure as low as 50 lbs. Samples of standard pipe, perfectly welded, may be found which will stand high pressures, but it is the lesson of experience that extra-heavy pipe can alone be relied on for car-heating service. In the latest and perhaps the severest test that has unfortunately occurred the safety of the Gold system's extra-heavy piping has been proved. Bad workmanship and poor material are largely responsible for the slow substitution of steam heating for the "deadly car stove."

THE SCRAP HEAP.

Notes.

The Lehigh Valley is to adopt the standard code of train rules on Feb. 1.

The train collectors are to be taken off from the Lexington Division of the Cheasapeake & Ohio.

Three of the persons injured in the collision at the Hackensack River on Jan. 15 have died, making 12 deaths in all.

The Empire State express recently ran from Albany to Syracuse, 148 miles, in 151 minutes. The train stopped five minutes at Utica.

The Boston & Maine has taken off a number of passenger trains between Boston and points 40 or 50 miles out. This is in addition to a considerable reduction in train service made several weeks ago.

The city of Pittsburgh has put 4,000 unemployed men to work in the city parks. The Baltimore & Ohio Railroad carries them free to and from the parks and benevolent citizens supply them with free coffee and soup.

The Norfolk & Western announced that a general reduction in salaries and wages will be made on Feb. 1. In January a cut was made on the salaries of the officers in the hope that there would be no necessity to touch the wages of the men working for small pay.

John C. Haddock, the coal operator, has begun a suit for $550,000 against the Delaware, Lackawanna & Western to recover excessive and illegal freight, which he alleges the company has charged him during the past six years for transporting coal from his mines to Hoboken.

The three train robbers, Harding, Jones and O'Dwyer, who held up an Illinois Central train near Centralia last September have been sentenced to 20 years each in the penitentiary. All three entered pleas of guilty to the charge of burglary, and Jones pleaded guilty to assault with intent to murder.

A metal clasp and weight combined for throwing off letters at stations where trains do not stop has been devised and patented by Mr. George Clark, Night Baggagemen of the Concord & Montreal at Laconia, N. H. By the aid of a spring the letters are clasped tightly, and there is sufficient weight so that they will stay where they are thrown.

At Youngstown, O., a grand jury has returned indictments against the officers of an electric street railroad for failing to comply with the law requiring "vestibules" on cars for the protection of motormen. At Baltimore, Md., warrants have been issued for the arrest of the presidents of certain street railroads for violating the ordinance requiring fenders on cars.

The elegant new building of the Railroad Young Men's Christian Association at Forty-first street, Philadelphia, was dedicated on Jan. 22. This building, heretofore described in the *Railroad Gazette*, is three stories high, has a hall seating 700 and another seating 200, a gymnasium 45 × 45 ft., and other conveniences in proportion. The Pennsylvania Railroad contributed a large share of the money for building it.

The United States Senate Committee on Railroads has agreed upon a bill requiring railroads through the public lands to stop at town sites selected by the Secretary of the Interior. The measure is a general one, and applies to all railroads traversing the public lands, but was prepared for the benefit of the towns of Enid and Round Pond, in Oklahoma, on the line of the Chicago, Rock Island & Pacific. The road has made strong opposition to the bill.

The New York State Railroad Commissioners have refused to grant a certificate for the construction of a railroad about one mile long from the station of the New York Central at White Plains, N. Y., to the new Bloomingdale Asylum. The permit was asked for by men connected with the New York Central, and the proposed road was to be used as a freight line, but the Commissioners hold that public necessity and convenience do not require it.

The Guion Steamship Company, which, next to the Cunard line, is the oldest transatlantic steamship line, has practically ceased to exist, its passenger traffic having been transferred to the Anchor Line. The Wisconsin and Wyoming have been broken up into scrap iron and the Nevada is getting old and rusty. The Arizona and Alaska are still running, but they were long ago eclipsed by their swifter rivals. The freight service may be continued.

The fast mail train over the Chicago, Burlington & Quincy which runs from St. Louis northward in the morning on the west side of the Mississippi River, and which has been run for the past six months under a special arrangement with St. Louis newspapers, is to be continued another half year under the same arrangement, the revenue from the mail alone being still insufficient to support the train. It appears that besides the contributions of the St. Louis newspapers, the retail merchants of that city will also pay a share of the expenses.

The speed of electric street cars has been made the subject of special investigation by a reporter of the St. Louis *Republic*, and he finds that where the streets are comparatively clear the cars sometimes run as fast as 30 miles an hour; and he gives a number of instances of 20 miles an hour and over. The Mayor of Brooklyn, N. Y., recommends the appointment of inspectors to make records of the speeds of street cars at points where the men in charge are likely to violate the rules. He has found that the limit fixed by law is constantly exceeded.

The Southern Pacific is going topay its employees in checks instead of cash, as heretofore. Payment in money has been continued hitherto on account of the isolated situation of many of the employees, where it is difficult to exchange checks for cash. It is said, however, that the company will see that supplies of cash are sent out, so as to make exchanges convenient. In the account from which we gather these facts it is said that the paymasters' trains will be continued as heretofore, the paymaster dealing individually with each man in the old way.

Four Italian laborers were killed and 20 or more injured by the fall of a trestle at the west approach of the Palisades tunnel which is under construction near Fairview, N. J. A train of gravel had been backed upon the trestle and proved too heavy for it. The accounts indicate that the man in charge of the work blames the conductor of the gravel train for overloading the trestle contrary to instructions. This tunnel is the one which is to open a connection between the New York, Susquehanna & Western Railroad and its terminal station on the shore of the Hudson River, opposite 100th street, New York City.

A train of the Kansas City, St. Joseph & Council Bluffs was stopped and robbed at Roy's Landing, near St. Joseph, Mo., on the night of Jan. 17. This is the same place where some robbers were shot by railroad officers and policemen last September.

Two unsuccessful attempts were made to wreck trains on the Philadelphia, Wilmington & Baltimore, near Crum Lynne Station, Pa., on the night of Jan. 19. A discharged employee, somewhat intoxicated, piled scrap iron on the rails. He was arrested and, it is said, confessed. This was a diabolical act and it was on one of the most important railroads in the country, and yet the court held the man in only $500 bonds.

In the Ohio Legislature a bill has been introduced reducing the rate of fare on all railroads over eight miles long to two cents a mile. This bill has now become so familiar at the capitol that the reporters class it as a "chestnut." A bill has been introduced in the New York Legislature requiring railroads to put iron railings on the roofs of their freight cars on or before Oct. 1 next. The bill which was introduced last year at the request of the Buffalo Merchants' Exchange requiring the railroads to make no discrimination against that city in rates on grain from the West, has been again presented. The bill which has been under consideration in the Virginia Legislature requiring the railroads to give free passes to members has been defeated.

The Lehigh Valley has issued a circular to the superintendents and heads of departments calling attention to the depression in business and saying: Justice to those employees who are to-day in the company's service would seem to require that we should cease hiring additional men. From this date, as vacancies occur in any grade of the service, promotions will be made from those next in order in point of seniority, in accordance with the agreement of Dec. 5, due regard being had to the fitness and qualifications of each individual. You will only take on new men in the subordinate ranks of each department when absolutely necessary, and in taking on such men will pay due regard to the qualifications of the applicant, giving preference, all things being equal, to those men who are familiar with our rules and our road by reason of former employment thereon. . . .

A number of Atlantic steamship companies have agreed upon a plan to abolish a large number of branch agencies in New York City, establishing one union agency on the east side of the city and one in Harlem. It is said that the American, Red Star, North German Lloyd, Netherlands-American and Hamburg-American lines have joined in this agreement, and that the Cunard, White Star and Anchor lines have already taken similar action. The New York *Herald* reports that the steamship lines are also moving in the direction of an agreement to "freeze out" the emigrant agents at New York. The ships receive commissions from the railroads for sending emigrant passengers to them, and, to keep the peace with the agents, they allow the latter to share in this perquisite. The present scheme aims to throw all of this commission money into the treasuries of the steamship lines.

The authorities of the city of Chicago appear to have discovered a means by which street railroad companies, gas and electric light companies, etc., can be made to properly repair the streets after doing their underground work. The Superintendent of Streets recently brought up the point that repairs made on account of careless workmanship by these corporations should be paid for by them, even though the repairs were made years after the corporations had finished their work, and called upon them to pay for making certain repairs costing in all about $600,000. This demand was ignored, and after waiting a reasonable length of time the companies were notified that no further permits for tearing up the streets would be granted to companies refusing to pay for repairs traceable to their carelessness, either for further extensions or repairs. This brought the refractory corporations to terms, and in addition to settling for work already done, they finally signed agreements to pay for work done on their account during the present year.

South American Notes.

The Argentine Department of Public Works has asked for tenders for the construction of five iron bridges between Mendoza and San Rafael.

The Argentine Government is about to make new surveys for a highway across the Andes to Chili, starting from the Argentine town of San Juan Jactal.

The *Buenos Ayres Standard* gives the following summary of the industries of Argentine:

	Capital invested.	Gross yearly product.
Sheep farming	$551,000,000	$77,000,000
Cattle	275,000,000	39,000,000
General farming	144,000,000	86,000,000
Vineyards	55,000,000	8,000,000
Railroads	390,000,000	24,000,000
Miscellaneous industries	992,000,000	183,000,000
	$2,407,000,000	$417,000,000

An exhaustive report on the Trans-Andine Railway has been prepared by Señor Enrique Budge, Chief Engineer of the Chilian State Railroads, in which he estimates that $7,000,000 will be required for the completion of the Chilian section of this line. He also regards the estimates of traffic made by the Messrs. Clark as being far too small. These estimates were: 24 first class passengers a day, 40 second-class and 30 third-class; four tons express parcels; 18 tons fast freight and 40 tons slow freight.

It is said that the Bolivian Government will soon invite tenders for concessions for a group of railroads which would connect all the important centers of trade in that republic and provide an outlet to navigable water on both the Atlantic and Pacific sides of the continent. Instead of interest guaranties on the capital invested, it is proposed to offer extensive land grants along the lines of railroad upon which the companies to be formed could plant colonies. The routes suggested are:

	Miles.
Santa Cruz to the River Paraguay	360
Santa Cruz to Cuyabá (Brazil)	260
Santa Cruz to Cochabamba	380
Branches to Potosí, etc	240
La Paz to Tacna	250
La Pax to Cochabamba	270
Cochabamba to the River Beni	150

Competition Not a Panacea for Railroad Ills.

The New Haven railroad monopoly intends to crowd the Springfield route from its Boston and New York fast train service. It is spending large sums in straightening and improving the Shore line roadbed, while it is neglecting its Springfield Division. It has been taking off trains by way of Springfield and adding trains by way of Providence, giving faster time by the latter. Trains by the Shore line run entirely over the New Haven track, while by the Springfield route 100 miles of Boston & Albany track must be used.

What is to be done about it? There is no use, in these days of railway consolidation and railway choking of the competitive principle, to agitate independent Boston & Albany connections with New York, even supposing a new entrance to the metropolis from this direction could be secured. We must simply fall back on the transportation facilities to be had from the existing sufficient supply of track, and upon state intervention to compel the proper tender of such facilities. That New York entrance of the New Haven Company is not its own alone. The public has an interest in it; and the

public convenience in all right should be consulted in its operation—and the people of this section form a part of that public. This is not a new theory as to the rights of the public and the duties of railroads. It has been indistinctly enunciated in the interstate commerce law and more distinctly in the decisions of the commission. It is a theory which has got to be recognized and applied if the people expect to hold railroad monopoly as their servant instead of their master. We should hope the Boston & Albany would wake up to the bottling-up process. Its relationship with the New Haven through the Vanderbilts seems to be lulling it into a false sense of security.—*Springfield Republican.*

Chicago Drainage Board Finances.

The report of the Drainage Board, read at the annual meeting on Jan. 17, shows an amount of $2,097.816 expended for actual construction, and $1,293,687 for purchase of land for right of way, making a total amount disbursed of $3,888,427.

Since the date of its organization, the total receipts for the sanitary district have been $5.381,857 and the disbursements for the same period $5,186,504, leaving a balance on hand at the end of last year of $195,352. During the year $100,000 has been paid in interest on bonds, and the same amount has been expended in taking up the first one-twentieth of the bonded indebtedness maturing. The right of-way case at Kedzie avenue has been settled by the purchase of nine acres of land for $22,246. A letter was read from Congressman Durborow, who said the Chicago delegation in Congress would work for such appropriation in the river and harbor bill as the Drainage Board saw fit. President Wenter said that the board would be assisted by anything that helped to make the Chicago River deeper and straighter so a better current might be maintained.

The Lake Iron Ore Trade of 1893.

Both the *Iron Trade Review* and the *Marine Review*, of Cleveland, publish supplements showing the Lake Superior iron ore production for the 38 years ending in 1893.

The outputs by ranges for 1892-93 and the totals are as below, in gross tons:

Ranges.	1892.	1893.	Total.
Marquette	2,866,856	1,829,053	39,749,610
Menominee	2,261,499	1,466,197	18,245,547
Gogebic	2,973,993	1,329,464	14,576,686
Vermillion	1,167,650	820,621	6,105,794
Misaba	4,215	613,620	617,865
Miscellaneous	.....	.....	2,320
Total	9,074,213	6,058,955	79,297,822

The shipments by ports were as follows:

Ports.	1892.	1893.
Marquette	1,026,338	1,094,827
Escanaba	4,010,085	2,084,981
Ashland	2,223,683	1,117,524
Gladstone	115,886	203,588
Two Harbors	1,165.076	903,329
Superior	4,215	80,273
Duluth	.....	440,292
All Rail	528,930	170,144
Total	9,074,243	6,058,958 tons.

The production, as anticipated, has been but about two thirds of that of last year. Excepting in the case of the Misaba range this reduction has been fairly distributed, but in shipments there has been a rearrangement. The immense shipments for Escanaba have been cut in two, while Marquette has gained slightly on the shipments of 1892. The most noticeable reduction has been in "All Rail" shipments, showing a decreased demand from local charcoal furnaces and for fettling.

Some of the Tribulations of a Railroad Commissioner

The action, claiming £25,000 damages, for libel brought by Mr. Richard Speight, who was induced to leave the service of the Midland Railway, to take the post of Chief Commissioner of Railways in Victoria, against the proprietor of the *Age* newspaper, was concluded on Tuesday. The jury found for the plaintiff on only the eighth count of the indictment—which charged the defendant with alleging extravagance against the plaintiff—and awarded him £100 damages. The question of costs, which for the defense alone are said to have amounted to £21,000, was reserved. The initiatory proceedings were taken at the close of 1892, and during the whole of 1893 the case in some form or other has been before the Supreme Court. A proposal has been made in Melbourne to raise a national subscription to defray the cost of the defense. The railway interest at home should follow this example, and raise a fund to pay Mr. Speight's costs, which must have been very heavy. The experience of Mr. Speight in Victoria, and of Mr. Eddys in New South Wales, will, we should imagine, effectually prevent home railway officials from accepting posts under colonial governments.—*An English Exchange.*

Chicago Street Railroads.

The annual report of the President of the Chicago City Railway shows a total number of passengers carried during the year 1893 of 120,596,300, or an increase over the number carried the previous year of 32,577,409, about 33.23 per cent. The revenue of the company for the year amounted to $6,059,989 and the operating expenses were $3.422,040, or 56.75 per cent. The net earnings for the year amounted to $2,438,711, from which cash dividends of 24 per cent. upon the capital stock were paid, amounting to $2.100,000. The earnings of this company during 1892 amounted to $4,440,943 and the expenses of operating to $2,809,431, or about 63.84 per cent. of the gross earnings. For that year the company paid dividends of 12 per cent. In 1893 the cable lines furnished 65.27 per cent. of the receipts, the horse car lines 26.2 per cent. and the electric lines 8.71 per cent. The average daily earnings were $16,520.

The stockholders of the Chicago City Railway Company, at their annual meeting on Jan. 15, voted to donate to the Field Columbian Museum $100,000 of World's Columbian Exposition stock held by the company, and further authorized the directors to make a subscription not exceeding $50,000 in cash to the museum, upon the assurance from the trustees that the museum will remain permanently at Jackson Park.

Locomotive Building in England.

It is depressing to read the figures we published yesterday about the manufacture of locomotive engines in the private factories of the country. Fewer hands by 928 were employed last year than in 1892, and 2,611 less than in 1891. It is probable that another thousand will be dismissed next month, and the prospects for 1894 are said to be poor. The worst of it is that a good deal of the falling off is in foreign orders. A large part of the world used to get its locomotives from Great Britain. Now, unhappily, it makes them at home or gets them from America.—*St. James' Gazette.*

Charleston Street Railroad.

The city railway of Charleston, S. C., has accepted, conditionally, an offer of purchase of its franchises made by a syndicate of capitalists of Washinton, D. C. This road is now being operated as a horse car line, and is one of the best equipped in the South. From the very first year of its existence it has paid regular dividends of never less than six per cent. There are about 10 miles of road running through the best thoroughfares of the city. It is the purpose of the syndicate to proceed at once to convert the road into an electric system. This will require heavier rails than those used and a reconstruction of the line.

A Peculiar Accident.

We have an official statement of the circumstances attending the burning of the Wagner sleeping car San Antonio, on the Union Pacific Jan. 8. The San Antonio was the rear car in the train and was derailed at the stockyards switch east of Clark's station, Nebraska, by the truss-rod breaking on the sleeper Wyuta, the next car ahead of the San Antonio. The rod caught the head-rod of the switch, buckling it so that it pulled the point open, letting the San Antonio off the rail and onto the siding. The car ran about 450 ft. and turned over on an embankment about 4 ft. in height. Fire caught from the oil lamps and from the Baker heater at about the same time. Men succeeded in extinguishing the fire from the heater, but before they could get in effective work on the fire from the lamps, it had gained such headway as to be beyond control, and the car was totally destroyed.

LOCOMOTIVE BUILDING.

The hammer and boiler shops of the Schenectady Locomotive Works have started with a small force, and the other departments will probably begin running soon. The company has received an order to build three switch engines for the New York Central & Hudson River road and two for a Vermont road.

CAR BUILDING.

The Rodger Ballast Car Co., of Chicago, has received an order for an equipment of Rodger ballast cars from the Chicago, Burlington & Quincy.

The Fitchburg order has been placed with the Laconia Car Company of Laconia, N. H., which company was last week awarded a contract for 300 freight cars.

The Wickes Refrigerator & Car Co., Mr. Walter H. Wickes, President, has placed an order for 450 new Wickes refrigerator cars of 60,000 lbs. capacity with the Missouri Car & Foundry Co. The ice tank of these cars will be somewhat larger than usual, having a capacity of 6,000 lbs. of ice. The cars will be equipped with the Drexel coupler, Hinson draw bar attachment, Drexel truck, Hutchins roof and the Schoen pressed steel brake beam. The company has to the present leased 150 of the cars.

BRIDGE BUILDING.

Fowler, Tex.—The Texas Central will replace the present bridge, near Fowler, with a steel or iron structure. The spans will be between 105 ft. and 165 ft., and bids will be received immediately.

Frankfort, N. Y.—A bill appropriating $3,000 for building a bridge across the Erie Canal at this point is before the New York Legislature.

Niagara Falls, N. Y.—A bill has been introduced in the New York Legislature to empower the Niagara Falls & Suspension Bridge Co. to erect a new structure across the gorge, with accommodations for street car traffic as well as for foot passengers. The company's capital stock is to be increased $350,000.

Rochester, N. Y.—The Kellogg Iron Works, of Buffalo, has been awarded a contract at $3 070 for building an iron bridge over the Erie Canal in Rochester. The work will be done by the Department of Public Works of New York State.

Sonel, Que.—The City Council has granted a bonus of $50,000 towards the building of an iron bridge and viaduct over the Richelieu River.

Ste. Edwidge, Que.—Three bridges are to be erected here in the spring, two across the Saumon River and the other over the Moes River.

St. Liguori, Que.—The construction of an iron bridge was commenced last week by the contractors, Messrs. Paquet & Powers.

Toledo, O.—City Engineer Miller is now engaged in preparing plans for the proposed bridge at St. Clair street.

MEETINGS AND ANNOUNCEMENTS.

Dividends:

Dividends on the capital stocks of railroad companies have been declared as follows:

Boston & Maine, quarterly, 1½ per cent. on the common stock, payable Feb. 15.

Central Ohio, semi-annual, 3 per cent. on the preferred stock and 3 per cent. on the common stock, payable Jan. 31.

Evansville & Terre Haute, semi-annual, 3 per cent., payable Feb. 1.

Illinois Central, semi-annual, 2½ per cent., payable Mar. 1.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Chester & Lenoir, special, Gastonia, N. C., Feb. 14.

Grand River Valley, Jackson, Mich., April 25.

Junction Canal & Railroad Co., annual, Elmira, N. Y., Feb. 6.

Monterey & Mexican Gulf, special, New York City, Feb. 20.

New York, Lake Erie & Western, special, New York City, March 6.

Ontario, Carbondale & Scranton, annual, Scranton, Pa , Jan. 31.

Peoria & Easton, annual, Danville, Ill., Feb. 14.

Southwestern, annual, Macon, Ga., Feb. 8.

Western Terminal Co., special, Pittsburgh, Pa., Mar. 20.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Master Car Builders' Association* will hold its annual convention at Saratoga, N. Y., June 12. The hotel headquarters will be at Congress Hall, H. S. Clements. Manager.

The *Master Mechanics' Association* will hold its annual convention at Saratoga, N. Y., in June, immediately following the M. C. B. convention.

The *Freight Claim Association* will hold its annual meeting in Louisville, Ky., March 14.

The *New England Railroad Club* meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Wednesday of each month.

The *Western Railway Club* meets in the rooms of the Central Traffic Association, Monadnock Building, Chicago, on the third Tuesday in each month, at 2 p. m.

The *New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *Northwest Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, except June, July and August, at 8 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Tacoma Society of Civil Engineers and Architects* meets in its rooms, 201 Washington Building, Tacoma, Wash., on the third Friday in each month.

The *Association of Engineers of Virginia* holds informal meetings the third Wednesday of each month, from September to May, inclusive, at 719 Terry Building, Roanoke, at 8 p. m.

The *Boston Society of Civil Engineers* meets at Wesleyan Hall, Bromfield street, Boston, on the third Wednesday in each month, at 7:30 p. m.

The *Western Society of Engineers* meets at 78 La Salle street, Chicago, on the first Wednesday in each month, at 8 p. m.

The *Engineers' Club of St. Louis* meets in the Odd Fellows' Building, corner Ninth and Olive streets, St. Louis, on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Engineers' Society of Western Pennsylvania* meets at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa., on the third Tuesday in each month, at 7.30 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month at 8 p. m.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo , on the second Monday in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The *Denver Society of Civil Engineers* meets at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesdays of each month except during July, August and December, when they are held on second Tuesday only.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

Engineers' Club of Philadelphia.

At the business meeting, Jan. 6, President John Birkinbine was in the chair, and 72 members and visitors present. Maj. J. W. Powell, Director of the United States Geological Survey, gave a very interesting talk on "The Engineering Problem of Irrigating Large Areas," illustrated by maps showing the mean annual rainfall, the mean annual run-off, and the comparative elevation of different sections of the United States by color sections; also a chart showing diagrammatically the portion of improved land to the total area of the different countries of the world. He said that by careful examination of the rainfall and run-off, it will be seen that even by applying every river in the West for irrigation, the area which it will be possible to reclaim is still very restricted. In the Eastern regions the rainfall is, of course, very considerable; for instance, in the Potomac section, there is a mean fall of 40 in., of which half is evaporated and half runs off. In the section farther west, where the rainfall is about 10 in., if all of the water could be captured less than half of the land could be irrigated with a practical duty of 34 acre-inches. In the southwestern part of the country only about 1 acre in 1,000 can be irrigated. In our Western arid region of 1,000,000,000 acres it might be possible, if all the water could be utilized with a 20-in. duty, to irrigate 100,000,000 acres, but practically not more than 50,000,000 could be used. By the chart showing the proportion of improved lands to total area, it will be seen that the country of Denmark leads with about 80 per cent., with Illinois following with about 70 per cent., Pennsylvania about 45 per cent., and the whole United States about 16 per cent. Another important point to be considered is that artificial irrigation is not only to be used where it is necessary for any growth, but by its use, under scientific operation, it is possible to increase the growth per acre to quite a wonderful extent.

At the conclusion of his remarks, a unanimous vote of thanks was tendered Major Powell for his address.

The sixteenth annual meeting of the Club was held on Saturday, Jan. 20, 1894.

The following officers have been elected for the ensuing year: President, John C. Trautwine, Jr.; Vice-President, A. Falkenau; Secretary, L. F. Rondinella, and Treasurer, George T. Gwilliam.

Mr. John Birkenbine on retiring from the presidency of the Club recently gave some interesting statistics of that city.

"If an investigator," said he, "would traverse the 129 square miles within the city limits he would view 250,000 edifices, many of them marvels of engineering skill. In his journey he would walk streets and roads aggregating in length the distance from Philadelphia to Omaha, and would cross 268 bridges. The gas mains if laid continuously would reach beyond the Mississippi River, and the sewers would extend from Baltimore to Montreal. The streets are gridironed by street car railways sufficient to reach Pittsburg; and to give some idea of the countless miles of telegraph and telephone wires in this city, the wires in the single span over the

Schuylkill River at Market street aggregate 20 miles."

Glancing at the railway interests of the city, Mr. Birkenbine finds nearly 100 passenger stations, and the tracks of the Pennsylvania company within the city limits are sufficient to form a single track railroad to Pittsburgh, with a liberal overflow for sidings. The tracks of the Reading road within the city limits are sufficient to form a double track from this city to Pottsville, and a third track, which would extend beyond Reading. Realizing that the average mind is incapable of comprehending 21,500,000 cu. yds. of earth, which the entire removal of the islands in the Delaware River will necessitate, Mr. Birkenbine showed that that amount of earth is sufficient to bury Broad street, between the house lines, to a depth of 70 ft. throughout its entire length of nine miles, and leave enough surplus to deal with five miles of Market street in the same manner.

Montana Society of Civil Engineers.

The annual meeting of the Montana Society of Civil Engineers was held at Helena, Mont., Jan. 13, 1894. S. T. M. B. Kielland was elected an active member and Joseph T. Dodge an honorary member of the Society. The following officers were elected for the ensuing year: *President*, W. A. Haven; *Vice-Presidents*, J. S. Keerl and A. M. Ryon; *Secretary*, G. O Foss; *Treasurer*, A. S. Hovey, and *Trustee*, W. S. Kelley. J. S. Keerl was elected a member of the Board of Managers of the Association of Engineering Societies. President Haven delivered an interesting address reviewing the progress of the Society during the past year, and gave a summary of engineering progress. The Secretary's report shows that the Society now has 39 active members, 1 honorary member and 8 associate members. At the evening session Mr. John Herron presented a paper entitled "Conduct of Repair Work in Railway Emergency Cases." Mr. Herron illustrated several temporary bridges used by him in washouts on the Montana Central Railroad.

The Society then entered upon a discussion of certain questions relating to the measurement of water under the state statute.

It was generally conceded that the statute was very indefinite, and that different engineers could secure results varying at least 50 per cent. in the amount of water measured by applying different methods, all of which would comply with the wording of the statute. After the discussion lasting about an hour, President A. M. Ryon, of the State College of Agriculture and Mechanic Arts, formerly Professor of Civil Engineering of the College of Montana, was appointed a committee of one to make experiments, and to report to the Society some more satisfactory method of measuring water than that provided for in the statute.

Mr. Goodale, Superintendent of the Gangon mine, at Butte, spoke of the corrosion of iron pumps and columns caused by the presence of sulphuric acid in the water pumped from the Butte mines. He stated that in the Gangon mine there is considerable water constantly leeching down through the old stopes, and in so doing it seems to become impregnated more or less with sulphuric acid which acts on the columns and pumps.

"There is quite a difference in the character of the water in the different parts of the mine. The silver mines do not have water that is particularly troublesome, but in the copper mines there is a great deal of trouble. In the Gangon mine we have very troublesome and corrosive water. Four years ago it was not causing any particular trouble. We often used it for boiler feed, but found that its action on the mud drums made it necessary for us to discontinue using it for that purpose. It was still giving us no trouble in the pumps and columns, but as time went on and the mine was opened up, there was more of this low-grade ore for the water to leech through until the present year has brought us face to face with the necessity of using something besides iron for the columns. Two and a half years ago we put in a 7-in. column to throw this water to the surface, and for a while it showed no particular corrosive action, but during the last spring a corrosive action on the iron was very apparent, and the surprising thing about it is that the action shows first at the top of the column. As it went on more leaks occurred, until one length of pipe, consisting of 15 ft., had 13 clamps on it. It was fully determined that we must use something besides iron, but just what ought to be used is a serious question. There is one copper column in the mines in Butte, but copper is so expensive that it is almost out of the question for us to think of duplicating that column. There is also one brass column 5 in. in diameter, but I understand there is some objection to that. I think it is probable that we will have to come down to using iron pipe lined with wood, which is the cheapest method I know of keeping the water away from the iron."

Illinois Society of Engineers and Surveyors.

The ninth annual meeting of this Society was held this week at the University of Illinois, at Champaign, Ill. There were six sessions altogether—at 2:30 p. m. and 7:30 p. m. on Wednesday, Jan. 24; at 9 a. m., 2 p. m. and 7:30 p. m. on Thursday, and at 9 a. m. on Friday. The programme was arranged to have reports of the various committees read at each of the several sessions, instead of at a special business session. At the afternoon session on Wednesday reports of the officers were submitted, and papers read by D. W. Mead on the "Historical Geology of Illinois," and by Emil Rudolph on the topic, "What Can Be Done to Elevate the Standard of the Surveying Profession?" About 25 papers in all have been prepared for this meeting. The titles of some of these follow: Cribs and Retaining Walls, by E. M. Benson; Methods of Stake Driving, by J. W. Alford; Experience with Creeping Rails, by W. D. Pence; Mechanical Aids in Computing, by Prof. I. O. Baker; Bridge Erection, by W. F. Kendall; The Transportation Problem of the Future, by Frank Balcom; The Cost of Work, by Edwin A. Hill; The Present Status of the Metric System, by Samuel S. Greely; South America and Young Engineers, by P. Mogenson; Notes on Foundations of Granite Viaduct, by E. I. Cantine.

A number of topical questions of interest were to be taken up for discussion, among these being The Effect of Frost on Materials and, Structures and Abolition of Grade Crossings in Illinois.

Engineers' Club of St. Louis.

A meeting was held on Jan. 17 in the new quarters of the club, 1600 Lucas Place. Forty members and 12 visitors present.

The following programme for 1894 was announced:

Feb. 7—Washington University Testing Laboratory, J. B. Johnson. Feb. 21—The Manchester Ship Canal, John Dean. March 7—The New Water-Works, I., General Features, M. L. Holman. March 21—The New Water-Works, II., The Extension, S. Bent Russell, April 4—The New Water-Works, III., New Machinery, J. A. Laird. April 18—The New Water-Works, IV., Quality of the Supply, Robt. E. McMath. May 2—The New Water-Works, V., The Problem of Filtration, Robt. Moore. May 16—Punching as a Means of Testing Structural Steel, Theodore L. Condron. Sept. 19—Sharp Curves in Railroad Yards, E. A. Hermann. Oct. 3—Motions for Soaring Planes, Dr. C. M. Woodward. Oct 17—A Method of Determining Sewage Pollution of Water, Chas. C. Brown. Nov. 7—Progress in Steam Engineering, Col. E. D. Meier. Nov. 21—Report of Committee on Smoke Prevention, W. B. Potter, Chairman. Dec. 5—Annual Meeting. Reports of officers and committees. Nomination of officers for 1895. Dec. 19—Announcement of result of election. Address of retiring President.

Mr. Geo. R. Olshausen then addressed the club on street railways, dealing particularly with special work in track construction.

The discussion was participated in by Messrs. Crosby, Johnson, Laird, Hermann, Bryan, Kinealy, McCulloch and Crow. The necessity for a better form of brakes was discussed, the present types described and the practical experience with each stated. What was needed was a quick and powerful application of the brake at first while the car was still running fast.

Southern & Southwestern Railway Club.

A meeting of this club was held at the Kimball House, Atlanta, Ga., on Jan. 18. The chief subject for discussion was the report of the committee on methods of securing cylinders, smokeboxes and frames to avoid trouble with loose cylinders, which was read at the November meeting. Other subjects which were to be discussed were the following: (1) Improved Methods for Rapidly Cleaning Soot and Cinders from the Inside of Locomotive Boiler Tubes While the Locomotives are in Engine Houses. (2) The Advisability of Complete or Pressure Grinding on Tread of Wheels Cast in Contracting Chills. (3) Soft Plugs for Crown Sheets of Fire Boxes. (4) M. C. B. Rules of Interchange.

American Association of General Baggage Agents.

This Association met at St. Augustine, Fla., Jan. 19. The officers chosen for the ensuing year are as follows: President, H. P. Dearing, Michigan Central; Vice-President, Charles Loraine, Chesapeake & Ohio; Secretary and Treasurer, J. E. Quick, Chicago & Grand Trunk. The Association will hold its next meeting at Montreal.

Iowa Society of Civil Engineers.

The society held its annual meeting in Cedar Rapids, Ia., on Jan. 17 and 18. The following officers were elected: William Steyh, Burlington, President; J. D. Wardle, Cedar Rapids, Vice-President; Seth Dean, Glenwood, Secretary and Treasurer; T. A. McDonald, Cedar Rapids, and M. Tscheigi, Dubuque, Directors.

Canadian Society of Civil Engineers.

The annual meeting of the Society was held at Montreal on Jan. 9 and 10, President E. P. Hannaford presiding. The present membership was reported as 633, as follows: Honorary members, 7; members, 283; associate members, 133; associates, 60; students, 150. During the past year there has been considerable discussion at the regular meetings of the Society on a proposition to make the Society a close corporation and to secure the passage of a law by the Dominion Parliament providing that only members of the Society could use the title of civil engineer in Canada. A report on this subject was read by Mr. A. Macdougall. The report was referred back to the Committee for further consideration of the question and to report to the council by Oct. 1.

Mr. P. A Peterson presented the report of the Committee on Cement Testing, which was ordered printed. The election of officers resulted at follows: President, P. Alex. Peterson, Montreal; Vice-Presidents, Herbert Wallis, Montreal; Alan Macdougall, Toronto; P. W. St. George, Montreal; Treasurer, K. W. Blackwell, Montreal; Secretary, C. H. McLeod, Montreal; Librarian, William McNab, Montreal. Mr. Hannaford, the retiring president, delivered an address to the Society, and gave valuable information as to the cost of materials used in the construction and maintenance of railroads in Canada, the result of his long experience as Chief Engineer of the Grand Trunk.

PERSONAL.

—Mr. W. T. Kelly, formerly Division Superintendent of the St. Louis, Iron Mountain & Southern, has accepted a position on the Peruvian railroad now building from Callao to the interior.

—Mr. Samuel P. Hemphill, Superintendent of the Georgia Railroad, has resigned that office. He has held the office since 1885, and was previously Master of Transportation for five years.

—Mr. John T. Fish, General Solicitor of the Chicago, Milwaukee & St. Paul, has resigned that office, which he has held since 1887. He proposes to resume the practice of law in Wisconsin.

—Mr. George S. Baxter, Treasurer; Mr. George H. Earl, Secretary, and Mr. J. A. Barker, General Auditor, of the Northern Pacific Railroad Company, have resigned their respective places, but will continue to act in similar capacities for the Receivers.

—Mr. Franklin Fisher, Superintendent of the Brooklyn Elevated Railroad, and Mr. E. M. Hedley, Master Mechanic, and Mr. A. A Stuart, Engineer of Construction and Maintenance, of the same company, has resigned and those positions will be abolished.

—Mr. Jesse Lightfoot, Chief Engineer of the Philadelphia, Germantown & Norristown Railroad, died on Jan. 16 at Germantown, Pa. He had been Chief Engineer of the railroad which is operated by the Philadelphia & Reading since 1881.

—Mr. George Bartlett Prescott, a well known electrician and author of works on the telegraph and the telephone, died in New York City on Jan. 19, aged 64 years. Mr. Prescott was Manager of the telegraph offices at Springfield and at Boston between 1847 and 1858. He was then Superintendent of the American Telegraph Co., and in 1866 became Division Superintendent of the Western Union Telegraph Co.; and in 1869 he was made Electrician of the company in New York. From 1873 to 1881 he was Vice-President of the Gold & Stock Telegraph Co. He was one of the incorporators of the Metropolitan Telegraph & Telephone Co., and became President of both the Manhattan Telegraph and the American-Speaking Telephone companies. On both the telegraph and telephone he made many useful improvements. In conjunction with Mr. Edison he invented and introduced the quadruple apparatus for telegraphing.

ELECTIONS AND APPOINTMENTS.

Baltimore & Ohio.—Joseph Billingham, formerly Master Mechanic of the Gulf, Colorado & Santa Fe at Galveston, Tex., has been appointed Master Mechanic of this company's shops at Garrett, Ind.

Chesapeake, Ohio & Southwestern.—H. F. McFarland has been appointed Assistant General Freight Agent of this company, with headquarters at Memphis, Tenn.

Chicago, Peoria & St. Louis.—The general offices of this company which have been located at Jacksonville, Ill., have been removed to Springfield, Ill., by direction of the Receivers. The office of the General Freight Agent will remain at St. Louis, but the removal to Springfield includes the offices of the Superintendent, General Passenger Agent, Auditor, the Engineering and Claim departments.

The office of Assistant General Freight Agent having been abolished, all communications formerly addressed to E. A. Nixon as Assistant General Freight Agent, Jacksonville, Ill., should be addressed to H. E. Pilcher, Acting General Freight Agent, St. Louis, Mo.

Colorado Eastern.—At a meeting held in Denver, Col., recently, the following directors were elected: E. F. Hallack, C. M. Wicker, E. F. Vaughan, Frank Woodward and L. B. Johnson,

Columbus, Sandusky & Hocking.—The election of officers under the recent consolidation of the Columbus & Sandusky Short Line and Columbus, Shawnee & Hocking resulted as follows: President, W. E Guerin, Vice-Presidents, F. J. Picard and Col. Charles Parrott; Secretary, H. D. Turney; Assistant Secretary, E. H. Zurhorst; Treasurer, G. C. Hoover.

Evansville & Terre Haute.—The following appointments have been announced by the Receivers: Gilbert H. Wright, of New York, to be Secretary and Treasurer, to succeed W. J. Lewis. Mr. Lewis will still remain as Secretary and Treasurer of the Louisville, Evansville & St. Louis and Peoria, Decatur & Evansville. A. L. Sanger becomes Purchasing Agent, W. P. Whitney Auditor, and J. R. Sample General Superintendent. J. B. Cavanaugh, General Freight Agent, has been appointed General Passenger Agent as well as General Freight Agent, to succeed A. G. Palmer, who has resigned to become Secretary of the Receivers of the Peoria, Decatur & Evansville.

Great Salt Lake & Hot Springs.—The annual meeting was held in Salt Lake City, Utah, Jan. 16, and the following directors were elected: James F. Woodman, Josiah Barnett, J. J. Daly, E. B. Critchlow, H. B. Clawson and J. H. Woodman, of Salt Lake City, and David Stoker, of Bountiful. J. H. Woodman, E. B. Critchlow and H. B. Clawson are the new members elected. The following officers were elected: President, J. F. Woodman; Vice-President, J. J. Daly; General Manager, Simon Bamberger; Secretary, Charles E. Pearson; Auditor, A. C. Manbert; Treasurer, Frank Knox, all of Salt Lake City.

Gulf & Interstate.—The directors of this company, known as the "North & South" Railroad, the Populist project, have elected the following officers: President, E. Stoddard, of Wayne, Neb.; Vice-President, H. M. Dake, of Brookfield, Mo.; Secretary, F. J. Close, of Topeka; Treasurer Albert Griffin, of Manhattan, Kan.; General Solicitor, Noah Allen, of Topeka.

Kansas City & Beatrice.—John W. Dalbey, formerly Superintendent of terminals of the Missouri Pacific at Kansas City, Mo., has been appointed Assistant Superintendent of this company.

Mexico, Cuernavaca & Pacific.—The following are the officers elected at the directors' meeting held in Denver, Col., last week: President, J. H. Hampson; Vice-President and General Manager, D. B. Smith, both of the City of Mexico; Secretary, Charles Wheeler, of Denver; Treasurer, W. O. Staples, of the City of Mexico.

Minneapolis, St. Paul & Sault Ste. Marie.—J. F. Lee has been appointed District Freight and Passenger Agent, with office at 232 South Clark street, Chicago.

Northern Pacific.—At a meeting of the directors of the company in New York on Jan 17, the resignations of W. L. Bull and C. T. Barney as members of the board were accepted. No successors to the retiring directors were elected. John E. Searles, Treasurer of the American Sugar Refining Co., was elected a director to fill the vacancy caused by the resignation of Johnston Livingston, who was elected a director at the recent stockholders' meeting, but failed to qualify. Messrs. Bull and Barney were the only members of the old Board of Directors re-elected at the last annual meeting.

Ohio Valley.—B. F. Mitchell, formerly of the Chesapeake & Ohio, has been appointed General Passenger and Freight Agent, with office at Evansville, Ind. George D. Sparks has been appointed Auditor, and S. T. Copeland, Cashier, with office at Louisville, Ky.

Peoria, Decatur & Evansville.—C. W. McGuire, formerly of the Lake Erie & Western, has been appointed Auditor. A. G. Palmer, formerly General Passenger Agent of the Evansville & Terre Haute, has been appointed Secretary to Receivers E. O. Hopkins and E. P. Huston.

Phillips & Rangeley.—Mason Parker is General Freight Agent of this road instead of General Agent as previously reported. His headquarters are at Phillips, Me.

Portage Creek & Rich Valley.—At the annual meeting of the stockholders at Portage Creek, Pa., on Jan. 8, G. D. Briggs, C. A. Sweet, E. R. Spaulding, W. S. Skinner, J. B Kinney, Horace A. Avery and H. A. Avery were elected directors. G. D Briggs was reelected President, with the following officers: Vice-President, Charles A. Sweet; Treasurer, E. R. Spaulding; Secretary and General Manager, C. C. Briggs; Superintendent, W. S. Skinner, and Engineer, George E. Mann.

South Shore (Canada).—The first annual meeting of the shareholders took place at Montreal last week. The following directors were elected: Hon. Louis Tourville, President; J. R. Wilson, Vice-President; H. Beauchemin, Managing Director; J. M. Fortier, Joel Leduc, G. Ball, H. G. Beemer, directors. Ed. C. Lalond is Secretary.

St. Louis Merchants' Bridge Terminal.—William A. Garrett, Superintendent of the Terminal Railroad Association of St. Louis, has been appointed Superintendent of this company also, with headquarters at St. Louis, Mo.

Trinity, Cameron & Western.—At the annual meeting held in Cameron, Tex., Jan. 19, the following officers were elected: President, F. M. Crawford; Vice-president, R. Mewhinney; Secretary and Treasurer, M. J. Moore; General Manager, R. J. Lyles.

Union Pacific; Denver & Gulf.—The appointment of F. Wild, Jr., as Acting General Passenger Agent of this road, with headquarters at Denver, was announced this week.

United Counties.—Frank Carr has been appointed Master Car Builder, with headquarters at St. Hyacinthe, Quebec.

Washington & Chesapeake Beach.—A reorganization of this company has been effected and the following officers and directors elected: President, T. H. Anderson, Cambridge, O.; Vice-President, Henry C. Speer, Chicago; Secretary, Capt. A. H. Mattox, Cincinnati; Treasurer, John G. Slater, Washington. Directors, T. H. Anderson, Ohio; Henry C. Speer, Chicago; R. E. Doan, Washington; C. B. Matthews and Capt. A. H. Mattox, Cincinnati; C. C. Magruder, Upper Marlborough, Md.; John T. Hutchins, Friendship, Md.; Joseph W. O'Neall, John G. Slater and George S. Chase, Washington; Nathan Parkins, Virginia.

Wellsville, Coudersport & Pine Creek.—H. K. Opp, of Wellsville, N. Y., has been appointed General Superintendent of this road, a new office. John McEwen, of Wellsville, N. Y., has been heretofore President and General Manager.

White & Black River Valley.—At the annual meeting held in Newport, Ark., Jan. 16, the following directors were elected: W. J. Thompson, E. G. Thompson, J. B. Dent, A. N. Johnson, W. L. McDonald, J. T. Henderson, M. D. Thompson, Minor Gregory and J. P. Coffin. The officers elected were: W. J. Thompson, President and General Manager; A. N. Johnson, Secretary, and E. G. Thompson, General Passenger Agent, with headquarters at Little Rock, Ark.

Wyoming & Pierre.—The following directors have been elected for this company, recently organized: A. L. Sweet, Thomas A. Lemmon and A. M. Nichols, and A. S. Gilman, of Chicago; Henry P. Burkholder, Boston; George M. Nix and D. G. Scott, Dubuque, Ia., where the chief office is to be located.

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

Cape Fear & Yadkin Valley.—A good deal has been said in the local papers in the last few weeks about the probability of the extension of this line to connect with the Norfolk & Western. The northern terminus of the line is now at Mt. Airy, N. C., to which it was built in 1891, and it was then located beyond that point to connect with the Norfolk & Western in Virginia, a short distance beyond the state line. This is the work which it has been stated would now be undertaken. There is little doubt that this connecting line will be completed some time, but one of the officers in a recent letter states that the company is not likely to carry out the work at the present time, and it has not been under consideration.

Chicago, Burlington & Quincy.—It has been announced that the company will begin using its new line into St. Louis from the north on Feb. 1. The Missouri, Kansas & Texas, which has traffic right over this new line, will also begin using it on that day. The bridge across the Missouri River at Bellefontaine Bluffs has been practically ready for use for some weeks. The bridge across the Mississippi River at Alton, however, is still incomplete, two of the spans remaining to be erected. For the present both railroad companies will use the station of the Burlington at Second street, St. Louis, until the new building at Nineteenth street and Washington avenue, which will be a few blocks north of the new Union terminal station, has been erected.

Cincinnati, Union City & Chicago.—A 10-mile contract on this road was let last week to Foster, Bailey & Keefert, of Huntington, Ind. The company was organized about two years ago with J. W. Fawcett, of Louisville, as President, and surveys were made for a line from Union City, northeast to Huntington, Ind., about 70 miles.

Cleveland, Lorain & Wheeling.—It has been decided to begin the actual work of construction on the proposed independent entrance of this road into Cleveland this winter instead of waiting until the right of way is all secured, which would postpone the work until spring. This new line was incorporated as the Cleveland & Southwestern, but has recently been consolidated with the old company. The work about to be commenced will be at those points where heavy fills will be necessary, on which work can go on during the winter weather. The new road will be about 20 miles long, from the old line at Mallet Creek into Cleveland, and has been located about half way and right of way secured for this distance, which brings the road to Brooklyn village.

Elkton & Southern.—The Maryland Legislature has been asked to transfer to this newly organized company the appropriation of $30,000, which was voted in 1880 to the Elkton & Middletown Railroad Company for a new road in Cecil County. That line was never built, and the new company proposes to build through Cecil County from the Baltimore & Ohio road near Elkton to Chesapeake Bay, covering pretty much the route proposed by the former company, and expects to secure the sum appropriated for the old project.

Florence & Cripple Creek.—The contractors are making excellent progress on the work north of Florence, Col., and the line will be completed to the gold camp at Cripple Creek before the date set. The rock work in the cañon is the heaviest known in construction work in Colorado, and the difficulties of the engineers in running the line through the defile are many. There will be one tunnel on the route. Nearly 1,000 men are working on the contract.

Intercolonal.—The Minister of Railways announces that the Dominion Government has decided to proceed with the building of a branch to Dartmouth, opposite Halifax. The question of rebuilding the Halifax Narrows Bridge will be held in abeyance for the present.

Jacksonville, St. Augustine & Indian River.—John D. MacLennan, the contractor who is building the Lake Worth extension of this line, reports that he has now actively engaged upon the construction work nearly 2,000 men, a larger force than has been employed since the work was commenced in 1892 at Rock Ledge, Fla. He expects to have the grading and tracklaying completed through to West Palm Beach, on Lake Worth, the southern terminus of the line, by February. The magnificent new hotel called the Royal Poinciana, being built at Palm Beach by Mr. H. M. Flagler, chief owner of the railroad, is to be opened in that month, and every effort will be made to complete the railroad to Lake Worth in time for the opening of the hotel. The only possibility of the work not being completed is a delay in building the bridge across the St. Lucia River, but not much doubt is felt as to that work being finished in time.

Kansas City, Pittsburgh & Gulf.—The extension to Siloam Springs, Ark., was opened for freight and passenger traffic on Jan. 22. The stations south of Sulphur Springs are Nebo, Decatur and Gentry Springs, and the length of the new line is 25 miles.

Lac Seul.—Application will be made at the next session of the Dominion Parliament for an act to incorporate the above company, with power to construct a line from a point near Shelley or Monmouth station, Manitoba, on the Canadian Pacific, in a northeasterly direction to a point at or near White Mud Lake, on Winnipeg River.

Lake Chelan & Columbia.—The charter of this company was filed in Washington last week with a capital of $500,000. The proposed line is to extend through Spokane County in Eastern Washington, but no particulars of the proposed route beyond this are given. Francis H. Cook and L. C. Cook, of Spokane, are the incorporators.

Mexico, Cuernavaca & Pacific.—The stockholders' meeting was held in Denver last week and directors elected as reported. J. H. Hampson continues as President. The line is now completed across the range from Mexico City southward to Cuernavaca, a distance of about 60 miles. Its ultimate terminus is a point on the Pacific Ocean coast not yet selected. The company has a very liberal charter from the Mexican government. Roswell E. Briggs, of Denver, is now making a preliminary survey of the country between Cuernavaca and Chilpancingo. This will require about three months of hard work.

Missouri, Oklahoma & Texas.—This company has been chartered in Oklahoma with A. N. Spencer and W. M. Spencer, of Yukon, Ok.; J. W. Maney, of El Reno, Ok.; Bernard Corrigan, of Kansas City; E. C. Simmons, of St. Louis, as directors. The road will extend from a point in southwest Missouri west through the Cherokee Nation and Cherokee Strip, with a branch southwest into Texas.

New Roads.—A charter has been applied for in the Virginia Legislature by citizens of Henrico County for a proposed railroad to be about 16 miles long extending from a point in the city limits of Richmond northeast to the James River.

Northampton & Hertford.—The completion of this road to Jackson, in Northampton County, N. C, was celebrated last week. The line begins at Gumberry, on the Seaboard Air Line, and extends south through Northampton County to Jackson, a small town, about nine miles from the connection with the Seaboard Air Line. It is proposed to extend the line farther south, and ultimately to the Chowan River, about 30 miles from the present terminus. F. Kell is the General Manager at Gumberry, and the New York office is at 18 Broadway.

Oakland & San Francisco Terminal.—The plans of F. M. Smith, of San Francisco, and those interested with him in forming a company to operate a new railroad through Oakland and a ferry across the bay to San Francisco, in competition with the Southern Pacific, seem to be in a fair way to be realized, judging from the published statements in San Francisco papers. The business men of Oakland, who are anxious to break what they call the monopoly of the Southern Pacific, are supporting the new company. They have agreed to secure a subscription of $225,000 to the stock of the new company, provided that its officers will agree to complete within one year a wharf at Oakland; to construct and operate two ferryboats to run to San Francisco; extend the present electric street railroad at Oakland and extend the California & Nevada Railroad, a steam road, to Walnut Creek, about 10 miles, and make the entire road standard gage.

Old Colony.—The elevation of the main tracks of the Providence division for a considerable distance in Boston (Roxbury), involving the elimination of several street crossings, at an expense of $2,500,000, and which was decided upon two or three years ago, is to be accomplished now without delay. The Attorney-General of Massachusetts has made the following report to the legislature: Preceedings for the change of grade of these crossings were begun by the petition of the Old Colony railroad, filed June 25, 1890. Commissioners were appointed and a long series of hearings was had before them. The Commissioners filed their report Feb. 16, 1893. No final decree has been applied for or made confirming the decision of the Commissioners. As the commonwealth was brought into the system of the abolition of grade crossings principally, if not wholly, to put upon it a share of the expense, and as the changes are usually much more a matter of local than of general concern I have regarded it as the principal duty of the counsel for the commonwealth in these cases to secure the appointment of commissioners who are free from local influences or interests, and to see that the scheme adopted is not unnecessarily expensive, and to prevent the assessment upon the commonwealth of more than 25 per cent. of the cost, which is its minimum proportion under the statute. I have left it to the city solicitor of Boston to arrange for a decree upon the report of the commissioners at such time as he should deem proper. The decree, when made, constitutes the taking of the lands specified in the decision, and interest will run on the damages therefore, from that time. It was found impracticable to either raise the money or complete the plans for doing the work in 1893. It was therefore agreed that the decree should not be applied for before February, 1894, and the decree will be applied for in accordance with this agreement.

Ottawa, Arnprior & Parry Sound.—J. O'Brien, of Renfrew, Ont., has been awarded the contract for constructing the third ten-mile section of this road west of Eganville, Ont.

Pembroke Southern.—This company is asking for a charter from the Dominion Parliament to construct a road from the town of Pembroke to a point near the village of Renfrew, Ont., there to connect with the Ottawa, Arnprior & Parry Sound road.

Philadelphia & Frankford.—The Receivers of the Philadelphia & Reading have applied to the court at Philadelphia for authority to formally ratify the preliminary agreement made by the Receivers of the bondholders' committee of the Philadelphia & Frankford road, providing for the completion of that branch. The statement of the Receivers to the court gives a history of the relation of the Reading company to the new branch. The organization of the new line was promoted by the Reading company to secure the construction of a branch road from a connection with the Philadelphia, Newtown & New York Connecting, a branch of the Reading, near Crescentville, to Frankford, about three miles. It owns a majority of the stock of the proposed road, and has also guaranteed an issue of $500,000 of its bonds. These bonds have been sold, but the road is still unfinished and owes about $120,000, most of which is due to the contractor. The bondholders have agreed to provide the funds sufficient to complete the line, the Receivers making a contract as to the division of traffic earnings favorable to the branch road.

San Antonio & Gulf.—William Davis, of San Antonio, who has been interested in the Pan-American and other ambitious and unfinished railroad projects in Texas, is the chief organizer of this company, which has been chartered to build about 200 miles of road from San Antonio easterly to Velasco, Tex., on the Gulf of Mexico. For the last month he has been engaged in securing promises of local assistance from the townships and counties through which the road is projected, and it is reported that already about $8,000 has been pledged in subsidies. J. C. Fleike, of Iowa, is said to have a contract for 50 miles. The company was organized at San Antonio in January, with the following officers: William Davis, President and General Manager; Robert E. Saddler, Secretary; J. B. King, Treasurer.

San Diego, Fort Yuma & Atlantic.—Dwight Braman, of Boston, the President of this newly incorporated company, has given some particulars of the project, which includes the construction of the line from San Diego to Yuma, Ariz., about 175 miles, where connection will be made with the Southern Pacific. Mr. Braman is President of the San Diego Land Co., and the stockholders of that company have made large subscriptions to the capital stock of the new road. About $350,000 has also been subscribed at San Diego, and it is stated that the subscriptions to the stock in California will amount to $750,000. An issue of $8,000,000 in five per cent. bonds will also be made. Nothing is said about the surveys, but the Eastern directors state that construction work will begin soon. Warren Kimball, George H. Richards and F. S. Eaton, all of California, are directors, the latter being Treasurer of the company.

Southern Pacific.—The headings of the third and longest of the tunnels on the new Coast Line of this company south of Santa Margarita, Cal., met on Jan. 22. The contractors have been working on the tunnels for something over a year past. The tunnel just completed is 3,600 ft. long. It is at the summit of the Coast Range, about three miles south of Santa Margarita. The other four uncompleted tunnels will probably be finished during March. This Coast Line is over 110 miles long and connects with the present line of the Southern Pacific at Santa Margarita on the north and at Ellwood on the south. When it is in operation the company will have two lines from Los Angeles to San Francisco. The work now in progress is on the 16 miles between Santa Margarita and San Luis Opispo, and includes 8,000 ft. of tunnel work through solid rock.

Washington & Chesapeake Beach.—New interests have secured control of this project, and it is stated have arranged for the immediate commencement of construction work. The officers of the reorganized company are T. H. Anderson, of Cambridge, O., President; Henry O Speer, a banker of Chicago, Vice-President, and A. H. Mattox, of Cincinnati, a member of the Board of Control of that city, is Secretary. Coffin, Sullivan & Suffern, of New York City, have the contract for building the road. The line will be 27 miles long from a point on the Pennsylvania road, near Washington, D. C., southeast to Chesapeake Bay. The first work to be completed will be the long pier at Chesapeake Beach, which is to be finished in March. The company owns a large tract of land at this point with an extensive water front and has ambitious plans for developing the property. The chief offices are in the Washington Loan & Trust Company Building, Washington, D. C.

Washington & Georgetown Terminal.—A bill to incorporate this company, which was before Congress at its last session, has been reintroduced in the House of Representatives.

Wyoming & Pierre.—The incorporation of this company in Iowa was completed last week and Stephen W. Gilman, of Chicago; David G. Scott, of Dubuque, Ia., and others were elected directors. The company is now reported to be ready to go ahead with the construction of its proposed road to the coal mines in South Dakota. These mines have been purchased from Gov. Larribee, of Iowa, and others, and are located about 40 miles from Deadwood, S. D. The new railroad will be built from the mines to the nearest point on the Chicago & Northwestern Railroad and will be about 23 miles in length. It is said that the construction of the railroad will begin in the spring, as soon as the weather permits.

GENERAL RAILROAD NEWS.

Attica & Freedom.—The property of this company will be sold at Warsaw, N. Y., on March 3, under foreclosure of the mortgage held by the Continental Trust Company, of New York. This road extends from Attica to Freedom, N. Y., about 39 miles, and is a reorganization of the Tonawanda Valley & Cuba road. The company was formed in 1891 to succeed the latter company, but did not acquire possession of the entire line which had been operated by that company, the 26 miles between Freedom and Cuba being abandoned.

Baltimore & Ohio.—The following table gives the earnings and expenses of the entire system of this company for the six months of the fiscal year and for the month of December, as compared with the earnings and expenses for the same period of 1892:

Month of December.	1893.	1892.	Inc or dec.
Gross earnings	$1,875,682	$2,199,657	D. $323,975
Oper. expen.	1,291,795	1,626,819	D. 335,024
Net earnings	$583,887	$572,838	I. $11,049
Six Months to Dec. 31.			
Gross earnings	$12,833,987	$13,795,097	D. $961,110
Oper. expen	8,263,705	9,737,268	D. 473,563
Net earnings	$4,570,282	$4,057,829	I. $512,453

The net earnings of the lines east of the Ohio River for December, 1893, were $1,424,429, a decrease of $206,151. The net earnings increased $119,228. The lines west of the Ohio River earned $451,252; loss for the same period being a

decrease of $117,823. The net earnings were $99,074, a decrease of $880. The net earnings of the lines east of the Ohio River for the six months of the fiscal year to Dec. 31, 1893, were $9,426,661, a decrease of $1,009,205. The net earnings were $3,490,477, an increase of $128,837 for the same period of 1892. The lines west of the Ohio River earned for the six months of 1893 $3,406,426, an increase of $47,195. The net earnings were $1,078,905, an increase of $382,715 over 1892.

Cape Fear & Yadkin Valley.—The reports of the sale of this road by the present owners circulated some weeks ago and then denied are now admitted by the officers to have some foundation. The majority of the stock is held by the North State Improvement Company, which also owns the North Carolina Steel & Iron Works, at Greensboro, N. C. Last week a Receiver was appointed for that company, but it is stated that that action does not affect the railroad company and that there is no possibility of a Receiver being appointed for the railroad. In regard to the reported sale of the railroad it is stated, apparently on authority, that the committee appointed with this object in view has about closed negotiations with a foreign syndicate for a transfer of a controlling interest in the North Carolina Improvement Company, which carries, as before stated, the control of the railroad, as well as the iron works at Greensboro. The main line of the road extends from Wilmington to Mount Airy, near the Virginia state line, 248 miles. Including branches the company operates about 340 miles of road.

Denver & Rio Grande.—The report of the earnings of this company are of special interest at this time, and the statement for November will be found below:

Month of November:	1893.	1892.	Dec
Gross earn	$637,608	$818 698	$271,090
Oper. expen	349,635	432,219	82,581
Net earn	$287,970	$416,478	$128.508
Fixed charges, taxes, etc.	204,746	233,257	28,511
Surplus	$83,223	$183,221	$99,998
Five months ending Nov. 30:			
Gross earn	$2,848.045	$4,205,983	$1,357,938
Oper. expen	1,723,528	2,324,167	600.639
Net earn	$1,124,556	$1,881,815	$717,299
Fixed charges, taxes, etc.	1,012,499	1,128,728	116,229
Surplus for five months.	$112,017	$753,087	$641,070

Kentucky Union.—A decision of the United States Court at Louisville, made last week, ends the protracted litigation between the different classes of bondholders, and will result in the immediate sale at foreclosure of this road. Judge Barr's decree overrules the motion of the Columbia Finance & Trust Company, the trustee of the second mortgage bonds, to suspend the decree of sale granted in the suit of J. Kennedy Tod & Co., the New York bankers, who represent about $3,000,000 of the first mortgage bonds. Unless J. Kennedy Tod & Co. interpose some objection to the sale, which is not likely, the foreclosure will take place in February.

New York & New England.—Judge Wallace, of the United States Circuit Court at New York, has appointed Thomas C. Platt, of New York, and Marsden J. Perry, of Providence, R. I., permanent Receivers of the railroad company. In its answer filed in the original suit for a Receiver, in which Mr. Platt was appointed temporary Receiver, the railroad company admits that it is not able to pay its obligations as they mature, and is without means to protect itself against open default. It denies, however, that the railroad has been operated at a loss, or that its lines are in bad physical condition.

New York & Putnam.—The reorganization of the New York & Northern under this title has been completed, and Charles F. Cox, of New York, has been elected President, but the road will be operated by the officers of the New York Central & Hudson River road, which has secured control of the property through the foreclosure sale in December.

This week the New York State Railroad Commissioners gave a hearing on the petition of the New York Central Company to have the Commissioners formally ratify the lease of the road. Counsel for the minority stockholders opposed the lease, and the Commissioners have reserved their decision.

Northern Adirondack.—Alexander Munn, of New York City, has been appointed Receiver of this road in the suit of the Franklin Trust Company, of Brooklyn, trustee of the first mortgage for $420,000. The suit is a friendly one and will lead to the organization of the company. The road is about 56 miles long from Moira to Tupper Lake, N. Y., its chief traffic being the transportation of lumber.

Northern Pacific.—The breach between the Receivers and the present management of the company has been further widened by the happenings of the past week. On Saturday President Ives issued a statement announcing that the Secretary, the Treasurer, and the Auditor of the company had resigned, and that their resignations had been forced by the Receivers, who objected to the officers acting in similar capacities for both the Receivers and the railroad company. President Ives said that as the directors had no funds to pay salaries they could not appoint new officers, and as the Receivers held all the books of the company, and the corporate seal, no transfers of stock could be made. The officers named were reappointed soon after the annual meeting, when the new management came in at the request of the Receivers, and have since acted for both Receivers and railroad. When the Secretary signed the petition of the present directors for the removal of the Receivers, the latter, President Ives says, insisted upon the three officers resigning from the railroad. The Receivers replied to President Ives' statement, and the New York newspapers for a number of days have printed signed communications from either side of the dispute, and some days from both sides. The directors have applied to the Court for the custody of the books and for money with which to conduct the business of the company. The old charges against the former management, which were made the basis for requesting the removal of the Receivers were repeated. Receiver Oakes again repeated his general denial, and stated that a full statement would be given in his answer when presented to the Court.

President Ives has requested stockholders to pay to the present officers an assessment of $12 50 for every 100 shares of stock to provide funds for the expenses of the management.

Pennsylvania.—Negotiations between the Pennsylvania Railroad and Speyer & Co., the New York bankers, have been closed for the sale of $5,646,000 United New Jersey Railroad and Canal Company four per cent. first mortgage 50-year bonds. These bonds are issued by the Pennsylvania to take up an equal amount of bonds maturing March 1 and Oct. 1 of this year.

Union Pacific.—The reports of earnings for November and 11 months are given in the following tables:

OREGON SHOR LINE & UTAH NORTHERN.

November—	1893.	189 .	Dec
Gross earnings	$455,409	$651,779	$198,370
Oper. expen	242,321	365,858	123,535
Net earnings	$213,086	$287,921	$74,835
Since Jan. 1:			
Gross earnings	$4,475,587	$5,626,427	$1,149,840
Oper. expen	3,310,243	3,937,579	627,236
Net earnings	$2,166,244	$2,688,848	$522,604

UNION PACIFIC, DENVER & GULF.

November.			
Gross earn	$457,330	$545,927	$88,626
Oper. exp	307,407	388,164	80,757
Net earn	$149 893	$157,763	$7,869
Since Jan. 1.			
Gross earn	$4.696,303	$5,379,311	$683,007
Oper. exp	3,780,700	4,051,379	270,678
Net earn	$915,603	$1,327,932	$412,329

UNION PACIFIC SYSTEM PROPER.

November.			
Gross earn	$3,201.032	$4.076,570	$875,537
Oper expen	1,911,379	2,438,212	526,832
Net earn	$1,289,653	$1,638,358	$348,705
Since Jan. 1.			
Gross earn	$33,397,166	$39 546,161	$6,148,994
Oper. expen	22,603,415	24,755,936	2,152,521
Net earn	$10,793,751	$14,790,225	$3,996,473

TOTAL OF UNION PACIFIC SYSTEM.

November.			
Gross earn	$3,306,072	$4,232,201	$926,129
Oper. expen	1,995,091	2,549,787	554,693
Net earn	$1,310,978	$1,682,414	$371.436
Since Jan. 1.			
Gross earn	$34,689,087	$41,303,162	$6,614,074
Oper expen	23,674,417	25,960,128	2,285,691
Net earn	$11,014,640	$15,343,024	$4,328,383

Wilkes-Barre & Western.—The New York, Susquehanna & Western assumed the operation of this railroad on Jan. 22, under a traffic agreement. The road at present is only open for freight traffic, and it is stated that through passenger trains may not be put on before June. The road was built in 1892 from Stroudsburg, the terminus of the New York, Susquehanna & Western, northwest to Wilkes-Barre, Pa., 65 miles. It reaches anthracite coal mines in the Wilkes-Barre district owned by the Susquehanna & Western, which the company now expects to make much more profitable, having now its own line, and not being dependent as heretofore on the Delaware, Lackawanna & Western for an outlet.

TRAFFIC.

Traffic Notes.

The United States Express Company has secured the contract for the express business over the Chicago, Milwaukee & St. Paul system heretofore held by the American and Adams.

The Queen & Crescent has notified its Western connections that it will not participate with them in the thirty-dollar round-trip rate from Kansas City to Jacksonville, Fla., and return, which has been announced for the Corbett-Mitchell prize fight.

A committee has been appointed by the New England Associated Railroads to devise a plan for establishing in New York City a bureau of information regarding New England summer resorts. General Passenger Agent Flanders, of the Boston & Maine, is Chairman of the committee.

An order of the Court has been served on the Receivers of the Union Pacific to revise the agreement with the Union Pacific, Denver & Gulf concerning the latter's proportion of earnings from the time of their appointment. Under the new proportion the Gulf system will be credited with one and a quarter miles against one for the Union Pacific for every mile of haul. Under the old agreement the Gulf system received credit for three miles to one for the Union Pacific.

The New York, New Haven & Hartford has made a traffic agreement with the Central of New Jersey by which it is said that the latter is to send over the New Haven road a considerable quantity of anthracite coal and other freight which has heretofore gone either via Newburgh and the New York & New England or over the Poughkeepsie Bridge. The New Haven officers say that this traffic will amount to 500 or more cars a week and that it will necessitate an increase in the number of boats to transfer cars from Jersey City to the Harlem River terminus of the New Haven road.

The statistical circular of Peter Wright & Sons, of Philadelphia, lately issued, shows that for the year 1893 Philadelphia's grain trade fell off to a very discouraging extent, as appears by the following:

	Baltimore.	Phila.	N. Y.
Receipts wheat and corn, cars	26,520	10,456	34,422
" " " 1892	44,506	43,128	89,788
Exports wheat and corn, bu	20,263,643	9.589,143	50 849,971
" " " 1892	35,657,466	29,418,614	63,553,319

At Montreal, there was a decided increase of grain exports, 14,302,857 bushels wheat and corn having been shipped from there in 1893, as against 10,417,222 bushels in 1892. Portland, Boston and Newport News also show some increase. At New Orleans the exports of wheat and corn for 1893 were 19,875,319 bushels, against 21,588,121 bushels in 1892.

Chicago Traffic Matters.

CHICAGO, Jan. 24, 1894.

Eastern passenger officials seem sanguine that the Managers will ratify their proposed scheme for regulating the eastbound business and stopping the demoralization, which it is conceded never before reached its present proportions. I confess, however, that I have very little faith in any scheme which depends in whole or in part upon the discontinuance of commissions for its success, unless an absolute pool is formed. This, I understand, the Managers are not intending to do, knowing that such action would have a bad effect pending the possible passage of the Patterson bill. In fact, I know that the talk of a "pool" in connection with the proposed agreements on both freight and passenger business has mostly originated with the newspaper men. A most determined effort was made by these very same lines a year ago to abolish the payment of all commissions in their territory. Repeated meetings were held at New York and at all important gateways, at which resolutions were unanimously adopted by all the lines present pledging the discontinuance of commissions. These were meetings not only of the subordinate officials, but of the Presidents, and each representative attending them knew to a certainty that unless something was done to stop the demoralization the exact state of affairs which exists to day was sure to come quickly. The Commissioners of the Joint Committee, armed with this authority, made a prolonged and persistent effort to put the agreement into practical operation; yet it failed totally. Why? Because one or two lines who were not bound by the agreement refused to co-operate, and because some of the lines who attempted to carry it out in good faith soon found that other lines were paying commissions to "protect" themselves from "outside competition," and no alternative remained but to ignore the agreement, or go out of business.

Efforts are being made to bring about some kind of an agreement for the joint handling of the excursion business by the Western Passenger and Central Traffic associations. One of the chief difficulties in protecting their tickets heretofore, when the routes embraced lines in both associations, has been a lack of co-operation. One association has made rates which have been tendered to the other without regard to the effect they might have on the local business of the neighboring association, and, except in a few instances, they were obliged to take them or lose the business. There is no doubt but if the roads would place all this business in the hands of a joint committee it would result in large savings to all concerned, and at the same time facilitate the making of these rates, and consequently save considerable friction with the public.

A meeting of the Freight Committee of the Central Traffic Association is being held to-day to consider a revision of percentages with Western lines. In this connection a prominent official of a Board of Trade organization recently said to me that in his opinion the time would soon come when the roads would be obliged to discard the Mississippi River basing line and divide on an imaginary line which should pass directly through Chicago.

It is said that the pass agreement among the Western lines will result in cutting the list of passes issued to shippers fully one-half. So far the lines have been able to hold together in the matter, which is more than they have ever been able to do heretofore.

As I predicted, Central Traffic lines are finding it difficult to enforce their decision not to pro rate with the Texas lines and the indications are that it will soon be abrogated. The trouble has always been, and will continue to be, until a stronger organization is formed than at present exists in this territory, that there are always enough lines who will ignore the order if by so doing they can get a little more business. Repeated but unsuccessful attempts have been made to enforce the withdrawal of divisions with connections, until now the outside lines laugh when threatened with discipline.

After another week spent in conference between representatives of the Great Northern, Canadian Pacific, Northern Pacific and Union Pacific, an amicable solution of the trans-continental passenger rate difficulty appears to be as far off as ever. An agreement was reached between the Great Northern and Canadian Pacific by which the former agreed to make satisfactory divisions with the latter through New Whatcom, which would admit the Canadian Pacific to the Puget Sound territory, and in return for which that company agreed to withdraw its demand for a differential, except via Victoria, and to enter San Francisco on the same terms as those accorded the Northern Pacific and Great Northern. A conference was then had with the lines members of the Western Passenger Association, at which it was proposed to the latter that they join in a rate of $55 first class and $47.50 second class from Chicago to San Francisco. The effect of such action on the part of the Chicago-Missouri River lines would be to shrink the proportionate rate between Chicago and the river to $5 first class, instead of $12.50 as now, as the present rates from the Missouri River to the Pacific Coast are $50 and $35. This proposition was not satisfactory to the Western lines. There is very little likelihood that the Chicago-Missouri River lines will agree to any rate which will not allow them local rates to St. Paul, and if the Northern lines want to make an agreement they must do it among themselves. Another question will come up when the matter is brought before the Western Passenger Association. That is the position of the Atchison and the Alton in regard to the allowance of a differential via the Northern route, and it is quite probable that neither of these lines will agree to the establishment of any such principle.

The Chicago & Ohio River lines have entered into an agreement for a division of all party and theatrical business between Chicago and Cincinnati and Chicago and Louisville, including all such business coming from the East via Chicago. The reported percentages are: On Cincinnati business, Pennsylvania, Monon and Big Four, each one-third; on Louisville, Pennsylvania and Monon, divide equally.

Eastbound tonnage last week resumed its normal condition. This is taken as indicative that so far the Eastern lines are living up to their agreement to restore rates and stop manipulating them. Still as the tonnage movement has been largely anticipated during the past three weeks there may have been comparatively little incentive to cut.

The shipments of eastbound freight, not including livestock, from Chicago, by all the lines, for the week ending Jan. 20 amounted to 80,073 tons, against 129,055 tons during the preceding week, a decrease of 48,982 tons, and against 66,487 tons for the corresponding week last year. The proportions carried by each road were:

Roads.	W'k to Jan. 20.		W'k to Jan. 13.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central	6,387	8.0	15,471	12.0
Wabash	8,340	10.4	9,576	7.4
Lake Shore & Michigan South.	8,955	11.2	14,417	11.2
Pitts., Ft. Wayne & Chicago	13,515	16.9	26 989	20.9
Pitts., Cin., Chicago & St. Louis	14,095	17.6	20,478	15.9
Baltimore & Ohio	3,090	3.8	4,293	3.3
Chicago & Grand Trunk	9,833	12.3	11,402	8.8
New York, Chic. & St. Louis	5,603	7.0	11,217	8.7
Chicago & Erie	8,275	10.3	12,823	9.9
C., C., C. & St. Louis	1,980	2.5	2,389	1.9
Totals	80,073	100.0	129,055	100.0

Of the above shipments 7,615 tons were flour, 46,477 tons grain and millstuff, 9,868 tons cured meats, 10,220 tons dressed beef, 1,200 tons butter, 1,112 tons hides and 2,340 tons lumber. The three Vanderbilt lines carried 26.2 per cent., the two Pennsylvania lines 34.5 per cent.

(Other Chicago traffic news will be found on page 61).